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ON

RHEUMATIC HEART DISEASE IN CHILDHOOD.

Delivered before the Medical Society of London

BY F. JOHN POYNTON, M.D., F.R.C.P. LOND.,
PHYSICIAN TO THE HOSPITAL FOR SICK CHILDREN, GREAT ORMOND-STREET; PHYSICIAN TO UNIVERSITY COLLEGE HOSPITAL.

LECTURE II.*

Delivered on Feb. 28th, 1928.

IN this lecture I shall discuss the advantage that I believe would result from basing the study of heart disease as far as possible upon its development in the young, and building upon this foundation the further manifestations of heart disease in the adult. This should be of particular value in the study of the infective diseases of the heart. We should teach first the earliest signs of cardiac disorder, those which occur at an age when the heart is at its greatest perfection, rather than the later and complex signs which distinguish a heart scarred by past disease or degenerated by alcohol or damage to the coronary vessels. We should dwell upon the efforts made by the young heart to recover from an acute infection, and upon our knowledge of the factors that tend to prevent further infection and damage rather than upon minute differences in the action of cardiac tonics and their effects on a worn-out heart. We should indicate first of all how to prolong the life of the heart by prevention and anticipation, and thus create around the subject an atmosphere of hope rather than one of that melancholy which must surround our feeble efforts at combating chronic morbus cordis.

The physician with wide experience of the symptoms of heart disease in the young can best appreciate those peculiar to the adult. In the rheumatic form of childhood all or any parts of the heart may be attacked, and its study demands accurate clinical observation, great patience, and watchful care in treatment, with a mind quick to appreciate and apply advances in knowledge, both therapeutic and strictly scientific.

It may be of service to put forward some features that have attracted my attention, for comparison with the experience of others, and to mention some of the landmarks which have seemed to me of value.

AGE OF ONSET.

The early age at which rheumatic heart disease may appear is remarkable and of vital importance. There are a few records of women suffering from acute rheumatism in pregnancy and of the detection of a murmur in the fœtus in utero. When I was pathologist at St. Mary's Hospital I made a post-mortem examination upon a two-days-old infant whose mother had suffered from rheumatic fever in pregnancy. The child was very cyanosed and the post-mortem examination showed large vegetations upon the mitral valve, spreading to the aortic and containing masses of streptococci. This case was the one which urged me to investigate the cause of acute rheumatism, and it is somewhat ironical that Paine and I spent our first two years in searching for Achalme's bacillus and discarding streptococci! I have seen chorea with acute cardiac dilatation at 10 months, and a child with chorea and mitral disease at 2½ years, followed by rheumatic relapses and definite mitral stenosis by the fourth year. These early cases are most instructive, on account of their clinical course and histories and because it is at this early age that we are likely to meet with considerable difficulties in diagnosis.

The highest incidence of rheumatic heart disease is, I believe, around the tenth year, and my statistics, based on over 1000 first attacks and compiled over 30 years, support this statement. My impression is that acute rheumatism is more frequent before the fifth year than is generally recognised, for in 1908 I had no great difficulty in collecting 52 cases, all under personal observation. Forty-three of them had organic heart disease, eight were fatal, and five were complete invalids. A review of the last 100 cases of acute rheumatism admitted to my ward at the Hospital for Sick Children, Great Ormond-street, showed that 13 had the first attack of rheumatism between two and five years. One died at 4 years and 11 months of carditis; six had organic valvular disease; four had repeated attacks of chorea and valvular disease; one had chorea; and one arthritis.

The following are five examples of early rheumatic heart disease.

1. A female, aged $4^{10}/_{12}$, 14 days before admission to hospital had a sore-throat followed by multiple arthritis, and then by carditis, which proved fatal.

2. A male, aged 4 years, living in a damp house, was brought to the hospital for chorea. He was found to have mitral endocarditis with an enlarged heart.

3. A female, aged 2¾, had for seven days suffered from a "cold." This was followed by chorea, mitral endocarditis, and cardiac dilatation. There were recurrences of rheumatism, and at 4 years she had obvious mitral stenosis.

4. A female, aged 4¼, living in a damp house, had been ailing for six months. There were wasting, anæmia, nocturnal pains in the joints, and later, arthritis. On examination there was great cardiac dilatation with mitral endocarditis. The cardiac lesion had been unsuspected.

5. A female, aged 14½, three months before admission had become pale and progressively more feeble without any definite symptoms, then followed a slight chorea, then carditis with venous thrombosis, pericarditis, broncho-pneumonia, and death.

MODES OF ONSET OF RHEUMATIC HEART DISEASE.

This question is one which must necessarily be closely associated with the problem of deciding what is to be considered reliable evidence of heart disease. There will always, I imagine, be cases that elude us, and in the absence of arthritis and chorea we must expect parents sometimes to fail in recognising that their children are ill. A great number of cases of rheumatic heart disease in childhood fall into one of two groups, the first beginning with a sore-throat, arthritis, and muscular pains, the second with chorea. Then comes a smaller group in which there is a severe and dangerous attack of acute rheumatism with carditis and many manifestations. We are then left with a group which may be called primary cardiac rheumatism. This is not a clear-cut division, for though rheumatism may undoubtedly attack the heart predominantly and without any other noticeable collateral sign of infection, closer investigation often reveals a sore-throat, some suspicious pains, or even a passing arthritis so evanescent as to be neglected. Or the child may have had a considerable period of poor health, losing weight and strength, and becoming anæmic and short of breath, nervous and irritable; it may be feverish or troubled by night terrors or attacks of acetonæmia. Within this group is a small subgroup of cases in which the onset commences with a startling disturbance of rhythm—e.g., a heart-block or auricular flutter.

First Signs of Heart Disease.

In the rheumatic child acute dilatation is the earliest evidence, and I am a strong supporter of the great value of percussion. When the late Dr. D. B. Lees was studying dilatation of the heart I traced out many cardiac outlines in normal and cardiac children, and in fatal cases tested their accuracy by needles driven into the chest at intervals along the line of tracing. I am convinced that in childhood the deep cardiac dullness can be accurately ascertained, but I do not say—and this I emphasise—that this holds good in the adult. The peculiarly light form of percussion needed requires careful

* Lecture I. appeared in THE LANCET of Sept. 15th.

practice, and I have repeatedly been able to convince students how accurate percussion can be once they have realised the method. It is difficult to imagine a more essential undertaking in the whole field of clinical cardiology. An early rheumatic dilatation in childhood may precede endocarditis and pericarditis, and may occur irrespective of either. The complete picture is well known: the quickened pulse, the feeble impulse, the outline enlarged to the right, the left, and sometimes upwards, the short first sound with sometimes a soft systolic bruit internal to the apex, and an accentuated pulmonary second sound. If we do not accept the value of dilatation we are driven for our first evidence to the signs of endocarditis or pericarditis, and thus overlook one of the cardinal principles in heart disease; that first thoughts should be directed to the myocardium. This view of the value of percussion is disputed, and I agree with Dr. John Parkinson that the most satisfactory proof of an early heart involvement is the demonstration by electrocardiogram of such an event as heart-block. I hold, however, that the most useful information is most often gained from demonstration of dilatation by percussion.

The usual type of dilatation is acute, but on very rare occasions it may be fulminating. Those who have seen this clinical landmark of heart disease—an acute asystole as the result of a fatal primary rheumatic dilatation—can never forget the ashen pallor, the vomiting and horrible restlessness, the running pulse and embryonic heart sounds, the rapidly enlarging liver, and the pulmonary œdema without any general dropsy, save a little puffiness round the ankles and possibly of the face.

Another more frequent type of dilatation, with an nteresting bearing upon adult heart affections, is the subacute and chronic type usually associated in childhood, as in adult life, with much nervous disturbance. The dilatation does not subside and the heart remains large and feeble for a long time. As a rule a triad of symptoms develops, due respectively to the heart, the nervous system, and the digestive system. As a result the children are breathless on exertion, and may have fainting attacks and cardiac pain. They have a rapid and sometimes irregular pulse, the rate of which is influenced so greatly by emotion that we are often doubtful how to divorce the nervous from the cardiac element. The heart beat may be forcible but is ineffective. They suffer from flatulence and dyspepsia, which further complicate the condition. They improve with rest and care but rapidly become fatigued by over-exertion, and quickly relapse if it is continued. In some of these cases one suspects either an element of hyperthyroidism or else that the child has had from birth a constitutional weakness of the myocardium, which may be soft, fat, and flabby. An important point is the absence of valvular damage, so that if the dilatation is overlooked the child's condition may be considered entirely due to "nerves," and if he is old enough to go to a boarding-school he is likely to receive scant sympathy from the "muscular Christian" order of schoolmaster.

After puberty the nervous symptoms come much to the fore, particularly with females. Cardiac pains intensify, and the result is a condition of debility, lack of confidence, and general uselessness, as exhausting for the friends as for the patient.

My view, founded on observation, that acute rheumatism may produce in childhood the condition of "irritable heart," is strengthened by my experience of "D.A.H." among soldiers, and receives interesting and valuable support from an unpublished investigation carried out by my friend, Dr. John Parkinson, when on active service. He analysed with much care the histories of 3000 soldiers suffering from medical illnesses. In the first 1000 he found 172 men who had suffered from a definite attack of acute rheumatism without valvular disease earlier in life, and in this 1000 20 per cent. of the total of 630 cases of D.A.H. were found in the rheumatic group. In the second 1000 170 gave the same history of previous acute rheumatism, and 20·5 per cent. of the 610 cases of D.A.H. fell in this group. In the third 1000 148 gave a similar history, and 17·4 per cent. of the 664 cases of D.A.H. were in the rheumatic group. Thus an investigation concerned only with adults reached the same conclusion, that acute rheumatism without endocarditis is one of the most important agencies in the history of the "irritable" heart.

Disturbances of Rhythm.

The disturbances are probably the result of focal lesions in the connective tissue framework of the heart in the region of the bundle of His. The technical skill and necessary equipment for their study cannot be expected of physicians in general, and the exact significance of the electrocardiographic tracings is, in some cases, difficult to assess. A considerable bibliography has sprung up, and among the various papers those of J. Parkinson, Hope Gosse, and E. B. Gunson, in 1920, and A. E. Cohn and Homer Swift in 1924, are particularly helpful.

Sinus Arrhythmia.—The English writers remark that the presence of sinus arrhythmia does not signify that the heart has escaped infection, and with this my clinical experience is entirely in accord. They give a tracing that shows the combination of heart-block with sinus arrhythmia, and heart-block in acute rheumatism is evidence of myocardial damage.

Heart-block may vary from a mere prolongation of the P.R. interval to a complete block. H. G. Butterfield, in the volume of Heart for 1911–12, published a case which has always appealed to me. This was a girl, aged 16, who showed a partial heart-block for the last 11 days of her life while suffering from acute rheumatic carditis. After death a minute diplo-streptococcus was isolated from the pericardial exudation and inflamed valves. Aschoff's nodules were demonstrated in the myocardium, and a widely diffused inflammatory exudate, most intense in the region of the auriculo-ventricular node, was discovered. Naish and Kennedy [1] published a case of a boy of 16 suffering from carditis; similar changes were found in the auriculo-ventricular node. They also directed attention to the sudden onset of arrhythmia in a boy of 8. There could be no more striking example of complete heart-block, ushering in a very severe first attack of acute rheumatic carditis, than the case I published in the Archives of Disease in Childhood for February, 1927.

A boy of 13 developed a sore-throat and, four days later pain in the chest, fainting attacks, and vomiting. When I saw him there was obvious heart-block, the ventricles beating at 36, the auricles at 72, per minute. After about a week the block vanished, to be followed by arthritis, most severe chorea, and endocarditis of the aortic and mitral valves.

Several features in this case confirmed the observations of others—e.g., the transient block, in spite of the very severe carditis which followed; fever which was doubtless, in part, due to the sore-throat, and the early syncopal attacks which occurred before I saw the boy but which may reasonably be interpreted as of the Stokes-Adams type. Such cases are rare. A simple transient bradycardia may also occur in rheumatic carditis.

Auricular flutter may occur in childhood quite apart from rheumatism, and may even be congenital. In infancy the symptoms are remarkable—screaming, cyanosis, vomiting, drawing up of the legs, breathlessness and rigidity, cardiac dilatation, and sometimes acute failure. I have followed a case for years, but I have never met with such severe symptoms in acute carditis. Flutter must, I suppose, point to myocardial damage, though this may be quite transient and the flutter be a matter of seconds. When four months old this patient was nearly moribund from heart failure and had numberless attacks afterwards, yet now, at the age of 5, is well grown and much less liable to attacks.

Paroxysmal tachycardia may follow an attack of carditis.

[1] THE LANCET, 1914, ii., 1242.

Premature contractions are more commonly auricular than ventricular. Parkinson, Hope Gosse, and Gunson, pointing out the association of auricular premature contractions with flutter and heart-block, incline to the view that they are evidence of definite myocardial damage. Ventricular premature contractions are not so suggestive. There may be very considerable difficulty in distinguishing between premature auricular contractions and auricular fibrillation without electrocardiographic tracings.

Auricular fibrillation is a recognised feature in chronic rheumatic heart disease, and I saw a remarkable example in a boy of 12 who had an apparently well-compensated mitral stenosis. One day, in a hot sun, he bicycled many miles up and down hills and came home utterly exhausted and developed severe fibrillation. Sutherland has reported a case where it occurred in the acute stage of an early carditis, but I believe this to be very rare.

My conception of rheumatic disease of the myocardium is that in the acute carditis of childhood the general myocardial poisoning is the outstanding lesion in the production of clinical symptoms, and that, in comparison, the interstitial focal lesions are comparatively insignificant.

Valvular Disease.

The bead-like vegetations of early endocarditis, producing slight incompetence, could not in themselves cause any degree of dilatation, and the presence of actual valve deformity can only be ascertained by the constancy of a systolic murmur, which usually disappears with the dilatation. Later, if the mitral endocarditis is at all severe, the signs of hypertrophy will decide the point. There was at one time an idea that a systolic mitral murmur in a rheumatic child was of little importance. This is true enough from the mechanical aspect, both in adults and in the young, when the heart is stabilised, and the view was, I think, the result of a reaction against the vexatious and useless prohibition of exercise and ordinary activity. Nevertheless, in the rheumatic child, this murmur is an evidence of cardiac rheumatism and to this extent important, and we must certainly guard against any idea that mitral incompetence in childhood may not be most serious. In fact, such cases, when there has also been myocarditis, may run a disastrous course and never properly compensate. It may be the murmur that attracts our attention, but it is the condition of the myocardium that governs the situation. A well-known occurrence is the increase of intensity of a mitral systolic murmur when a child is once more renewing activity, and this may be brought forward as evidence of a mistake in treatment. On the contrary, however, provided the child is well and the impulse firm and stable, it is a good sign. After some years this murmur, even though loud and heard clearly toward the axilla, may gradually become fainter and finally inaudible. Such children, on being sent to a school at 14 with a warning to the doctor as to the previous history, have sometimes been so sound that I have been informed by the parents that it was thought I must have been mistaken in my diagnosis. At seven years I am sure there would have been no room for doubt.

Mitral Stenosis.—The association of mitral stenosis with recurrent chorea is well established and suggests a persistent activity of the infection as the cause of the stenosis. A valuable point is the frequency with which the process of contraction of the valve arrests. We require a large mass of evidence from supervision of convalescents over long periods. This is one instance of the great difficulties that surround such an inquiry.

Three years ago a girl of 10 was under my care in hospital with recurrent chorea and the first signs of a mitral stenosis. She was a long time in hospital and was treated with every care. Afterwards she went to a special convalescent hospital for eight months, and later to several other country rest-homes. On account of her recurrent rheumatism the tonsils had been carefully enucleated before her first admission to hospital. With no history of any serious illness throughout these three years, she returned to me for shortness of breath, and I then found an advanced mitral stenosis.

Could any result be more disappointing? Yet I am not convinced that we had learnt all we might about the case, for at present the organisation for special convalescent hospitals is hardly perfect. These should be centres for clinical research as well as for supervision.

Tachycardia is sometimes transient and sometimes more or less continuous. I have noticed this symptom appear at the very onset of the cardiac disease, even before any mitral stenosis could have developed. The most conclusive of all my cases was the following.

A girl, aged 9, living in a damp house, which was liable to flooding, had been ill for four months. She had become very nervous, suffered from severe headaches, and finally developed chorea, for which I saw her in March, 1902. There was dilatation of the heart and a pulse varying between 120 and 150 per minute; the thyroid seemed a little enlarged. She was in hospital six months and never had signs of pericarditis or endocarditis, in spite of the persistent tachycardia. Many of her teeth were carious and were removed, after which the tachycardia quieted down. The explanation that it was the result of a chronic sepsis from dental suppuration was generally accepted. She remained in hospital four months after the dental extractions, leaving in June. In July she returned with severe tachycardia and great nervousness, but there was no pericarditis or obvious endocarditis, renal disease, or tuberculosis. In June, 1903, the house was flooded and she developed rheumatic pains and tachycardia. In August chorea developed again, but there was no cardiac murmur. In 1904 she had another attack of chorea, and now there were signs of mitral stenosis with tachycardia. In 1905 a further attack of chorea occurred, with tachycardia, and there was further evidence of mitral stenosis. I saw her for the last time in June, 1910; she was then aged 17, and in domestic service, with an enlarged heart and every sign of mitral stenosis. Upon any excitement the pulse-rate rose to 150 per minute.

Cases such as these lead me to dwell repeatedly upon the nervous element in the cardiac disease of rheumatic children, and they teach a lesson which I think is of value in the study of heart disease in adult life.

Lastly, even in childhood, malignant endocarditis may supervene upon a mitral stenosis, although I believe this to be rare.

The rare cases of congenital mitral stenosis show changes in the valve that point to a reaction to infection rather than malformation, and I believe that most of the mysterious cases of mitral stenosis are the results of a primary cardiac rheumatism. How insidious and unexpected such cases may be is exemplified by a boy, aged 5, who came under my observation for a mysterious nephritis with blood and casts in the urine. This condition lasted many weeks with only the slightest rise in temperature; during that time warning signs of mitral stenosis developed, but there was no other rheumatic manifestation. The renal condition eventually recovered, but two months later definite chorea appeared and the valvular lesion slowly progressed. It is in the acute rheumatism of very young children that I have been particularly impressed with the insidious development of this lesion, and it is from experience of such cases that I have arrived at the conclusion that a mitral stenosis with no history of acute rheumatism is nevertheless in reality probably rheumatic. I need hardly remark how much we are baffled in the study of juvenile rheumatism and its heart disease by the term "acute rheumatism." I wish we could either call it "rheumatism" in accord with the term "tuberculosis," or, breaking down tradition, find some new and comprehensive name.

Aortic Disease.

Pure aortic regurgitation is in my experience exceptional. Doubtless it occurs, but the overwhelming majority of cases are examples of the combination of mitral and aortic damage, and there are many rheumatic children with this serious condition. The mitral lesion is usually primary, and the aortic follows later in the same illness or in another attack. There may be no premonitory symptoms, though

a slight rise of temperature may rouse suspicion. The weakening of the second sound in the aortic area, with the development of a soft systolic murmur and then of a soft diastolic murmur to the left of the sternum are well recognised, but cannot be over-emphasised, for this lesion is more often overlooked than any. These cases develop along two lines; either the mitral or the aortic lesion becomes predominant, and before childhood is past we may recognise clearly that the patient is doomed to suffer from aortic disease. In severe cases of carditis, extreme damage may occur in a few weeks, and within a fortnight the pulse may have already acquired the Corrigan features. The pulse may even disappear when the arm is raised, and sudden death can occur before the age of 12. On the other hand, I believe that some aortic lesions are so slight as to be recoverable. I am led to this from clinical observation, and from examples in the post-mortem room of slight thickening of the cusps where no aortic lesion had been detected. No children are more nervous than the rheumatic ones with aortic lesions of any severity, and, even though the heart has apparently compensated, this nervousness and inability to stand school-strain is a striking feature.

MALIGNANT ENDOCARDITIS.

In my first lecture I dwelt upon the tendency for cases of aortic and mitral disease to develop malignant endocarditis in later life; this may also occur in childhood after what appears to be a severe recurrent attack of acute rheumatism.

A boy, aged 16, suffered from acute rheumatism with carditis at the age of 6, and after that had three more definite attacks. His mother had suffered from rheumatic fever. Three weeks before admission to hospital he had pains in the ankles and knees and round the heart, and his mother thought that it was another attack of rheumatism. He was anæmic and wasted, and there was irregular pyrexia, with signs of aortic and mitral disease and infarctions in the spleen and kidneys. After death none of the vegetations seen on the valves exceeded the size of a pea, but the sections showed masses of streptococci.

This was the type of case which interested Litten in 1899 and led him to believe that rheumatism was becoming more septic in type.

I think we are most likely to throw further light upon this form of endocarditis by studying its development in children and adolescents who are known to have rheumatic heart disease. I hope that in the future many valuable records of rheumatic cases of morbus cordis, supervised over years, will be published, and that an increasing volume of evidence upon the onset of the malignant type will be forthcoming. Shall we find then that the circumstances of the onset were indistinguishable from those of a rheumatic attack, or will there almost invariably be clear evidence of some new type of infective illness grafted on the rheumatism, or proof that the new infection occurs in cases in which we have never felt satisfied that the rheumatism has ceased to be active? Experience shows that in many adult cases we have no guide at all to the causation of malignant endocarditis, but continuous records of the histories of rheumatic heart affections may eventually enable us to decide upon the cause or causes for the break in the history which produces this condition. It is necessary in such an inquiry to dismiss entirely from our minds any classification of malignant endocarditis based on its duration, and to be prepared to find fulminating, subacute, and chronic cases all developing in the rheumatic heart.

Here again you will recognise that the study of heart disease in the young makes a sound basis for the study of heart disease in general.

A certain degree of aortic stenosis is not infrequent in combined aortic and mitral disease, and if it develops later in childhood and adolescence it may relieve the heart of some of its difficulties, but a predominant aortic stenosis appears to me to be very rare, though I have for some years been watching a boy who suffers from an extreme degree of stenosis.

Pericarditis.—The consideration of pericarditis as an entity apart from endo- and myocarditis greatly hampers the education of the student. It is easy to grasp the idea of an inflamed serous membrane pouring out fluid, which gradually subsides, leaving the pericardium adherent, but this does not represent rheumatic pericarditis. In childhood there is rarely much fluid poured out, and the wide area of cardiac dullness is mainly the result of dilatation due to myocardial weakness. There may be no fluid, but much thickening of the pericardium, and the main danger of pericarditis is the concurrent myocardial weakness. In fact, it is impossible to consider rheumatic pericarditis apart from the other factors in a carditis. Virulent carditis with pericarditis may be afebrile. Acute dilatation and an excited and rapid action of the heart may precede the appearance of pericardial friction by several days, and even by a week or more. There may be no distress, and in some cases the discovery of the lesion comes as a complete surprise. There are cases in which it does far less damage than a severe myocarditis, so that its occurrence, though always serious, is not necessarily alarming.

Recovery, in the sense that the child may be able to leave hospital, can occur under five years even when there are very severe general carditis, chorea, profound anæmia, numerous nodules, and severe polyarthritis. Extensive pleurisy and mediastinitis are very grave complications, leading as they do to the worst type of adherent pericardium. The occurrence of pericarditis without endocarditis suggests some infection other than rheumatic, but I believe it may result from rheumatism.

Lastly, in some cases we may see the wave-like character of the rheumatic infection: an outburst, then a remission, then another outburst and remission, in some cases prolonged over months.

Venous thrombosis is an interesting complication in the severe carditis of childhood; I have seen eight examples. Seven of these implicated the large veins of the head and neck, two including the superior vena cava. At one time I thought these thromboses might have been mechanical, for they had all been associated with severe carditis, and it seemed reasonable to suppose that pericardial adhesions might have been a factor. In the eighth case the occurrence of thrombosis at the lower end of the inferior vena cava in a boy suffering from severe chorea and an endocarditis from which he made a good recovery, negatived the mechanical explanation. A. F. Voelcker's case of chorea and thrombosis without any cardiac lesion is still more conclusive. The condition is probably an acute phlebitis of rheumatic origin. As a rule the first noticeable sign is an œdema of one arm and then, if it is extensive, of the chest and face; there may be pain, tenderness, and resistance along the veins. In one of the fatal cases the superior vena cava and all the tributaries were occluded, and there was a pulmonary embolism, due to soft clot being detached from the lower end of the thrombus in the superior vena cava. I have never seen venous thrombosis in any other form of heart disease in childhood, but there can be no doubt of its occurrence and reality in rheumatic carditis.

Gangrene of the extremities I have met with in the severe mitral stenosis of young children. Gangrene may also occur in the malignant endocarditis of rheumatic children from arterial occlusion; in one such case, complicated by a femoral aneurysm, the entire limb became gangrenous before death.

Except for a slight degree of *aortitis*, seen after death in a few cases, I have not met with a severe inflammation of the arteries in acute rheumatism (or, if it occurred, I have failed to recognise it), and I have never seen extensive implication of the arteries in any post-mortem examination on a rheumatic child. Vaso-motor spasm is sometimes a sequela of acute rheumatism and causes cyanosis of a limb or a Raynaud-like affection of the fingers and hands.

The striking *anæmia* produced by virulent rheumatism is thoroughly recognised, and difficulties

may arise in differentiating some cases of aplastic anæmia and acute leukæmia from acute rheumatism. In all three there may be sore-throats and obscure pains in the limbs. The cardiac signs also may be most puzzling, for in the primary anæmias a loud systolic mitral murmur may be audible, and when they are extremely severe a basal diastolic murmur may be detected. The pulse is rapid, and the first sound at the impulse so abrupt as to simulate very closely the lesion of mitral stenosis. In all three there may be fever, breathlessness, purpura, and some enlargement of the spleen. If the leukæmia shows a leucopenia, the differential count requires considerable skill, and the blood of an aplastic anæmia also requires skilled investigation. I have seen remarkable examples of the difficulty in the diagnosis of these cases, particularly when the original one of rheumatism has been made in error. The anæmia is generally more predominant in the blood disease than in rheumatism, and the so-called "rheumatic symptoms" usually resolve themselves merely into ague pains.

It is interesting to observe, when one of the curious remissions occurs in a primary anæmia, that almost all the cardiac signs also disappear, to recur with the relapse. This has no parallel in rheumatism.

The Thyroid.

It is possible that the thyroid gland may play a greater part in the disturbances of the heart in rheumatism than we realise. In this country Llewellyn Jones Llewellyn has for many years insisted upon its importance in rheumatic affections, and French writers have alluded to rheumatic thyroiditis in adolescents. I have recently seen four examples of thyroid enlargement with tachycardia, tremor, and acute rheumatic morbus cordis, though in none was there apparently any thyroiditis. The problem is difficult, for it is exceptional to find any obvious enlargement of the thyroid in children suffering from acute rheumatism, and so we are driven at present to the assumption that damage, if it is frequent, must be due to an increase or alteration in the secretion without any perceptible change in the size of the gland. Sometimes, but very exceptionally, I have noticed swelling of this gland in chorea, and in our ignorance of the nature of the rheumatic poisons and our knowledge of the remarkable nervousness of the rheumatic child we have reasons for investigating this subject further.

Summary.

It is clear that endocarditis in all its phases can be studied in the child, but in the adult we are usually concerned less with the development of endocarditis than with the results it has produced by scarring. In the child we learn in detail the history of pericarditis, and, though rheumatic pericarditis may occur in a patient over 70, opportunities for a complete study in adult life are far fewer. We learn also from the first the importance of the myocardium, and in the child we get striking illustrations of the symptoms that result from its general damage. We see how the "weak heart" may arise, and how, in the adult, this may give way under stress and strain. We are led to appreciate the nervous element, which is of such importance in the history of heart disease at all ages, and to realise how early in life this element may assert itself. The remarkable vitality and recuperative power of the child's heart impresses upon us the necessity for studying the factors which in adult life sap this vitality. There is the natural decline of cardiac power with the arrival of old age, but there are also the acquired factors, such as atheroma of the coronary vessels, high tension, or the damage done by poisons such as alcohol. Realising the freedom of the child's heart from these dangers, and guided by our knowledge of juvenile rheumatic heart disease, we are more easily able to appreciate such differences in the behaviour of these damaged adult hearts as the appearance of angina pectoris, the sudden disaster of a coronary thrombosis, or the defeat of a heart in the long battle against the strain of hypertension. We can see more closely the essential difference between the rheumatic child who breaks down from the renewed attacks of the active disease and the adult who, surviving an early rheumatism, breaks down from the gross deformities of the valves which have been left as its legacy.

We can also appreciate more fully the differing character of the lesions and symptoms that occur when an infection of another type peculiar to adult life—the acquired infection of syphilis—attacks the heart and blood-vessels.

We bring with us the same mental attitude to adult heart disease that we do to the heart disease of the child, and are led instinctively to search for the early warnings and early events that lead to its development.

We find our most promising fields for the study of mitral stenosis, and probably of malignant endocarditis, in the young. We can also learn the best methods for the prevention and amelioration of morbus cordis.

Finally, a problem in the study of heart disease in childhood which may eventually need careful thought is this: how will arrangements be made for the student of the future to obtain a general view of acute rheumatism in its true perspective if, as seems possible, he is to be educated by an orthopædic specialist in rheumatic arthritis, by a neurologist in chorea, by a children's specialist in acute rheumatic heart disease, and by a cardiac specialist in chronic heart disease? What will he eventually know of the general disease "acute rheumatism"—the chief cause of morbus cordis in this country? Should we not remember, before it is too late, words of that great genius, Roger Bacon, "As with an eye torn out, or a foot cut off, so it is with the different departments of wisdom; none can attain its proper result separately, since all are parts of one and the same complete wisdom"? Realising that this was the central theme of his *opus magnus* and the guiding star of that mighty intellect, should we not pause and think?

THE REGULATION OF RESPIRATION.

A SUMMARY OF RECENT EXPERIMENTS.*

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Several years ago, as a result of experiments on the effects of hæmorrhage and reinjection on pulmonary ventilation, I called attention to serious exceptions to the prevailing theories of respiratory control. For example, a systematic review of the relation of blood acidity to pulmonary ventilation revealed a more frequent inverse than a direct relation of pulmonary ventilation to the hydrogen-ion concentration of the blood. The common inverse relation of pulmonary ventilation to alveolar and arterial carbon dioxide pressure served as an exception to a primary control by changes in the arterial and alveolar carbon dioxide. Increased pulmonary ventilation associated with either low or excessively high alveolar oxygen pressure was an exception to the theory of the direct effect of oxygen on respiratory activity.

Our informaton on the chemistry of the blood, on the aerobic and anaerobic acid metabolism of the cell, and on the behaviour of the cell membrane to the movement of acid and base, hardly warranted the assumption of parallel changes in acidity within and without the metabolizing cell. The probabilities rather favoured a frequent occurrence of opposite changes in acidity within the cells and in the blood, and appeared to offer an opportunity of formulating an all-inclusive theory of respiratory control, avoiding the exceptions to the prevailing theories. In brief, a direct relation was assumed between the acidity of the respiratory centre itself and pulmonary ventilation.

* An address delivered at the opening of the university clinics and new medical laboratories at the University of Chicago.

With the use of various continuous methods, acute respiratory disturbances produced by administration of carbon dioxide, sodium carbonate, sodium bicarbonate, mechanical asphyxia, low and high alveolar oxygen, sodium cyanide, and hæmorrhage and reinjection were followed and analysed with respect to the acid base equilibrium of the tissues and body fluids.

The accompanying figure shows in a very schematic way the more outstanding results of our experiments. The first column tabulates the types of procedure, the second indicates the changes in acidity of the circulating arterial and venous blood, the third correlates the associated changes in pulmonary ventilation. The following column gives the changes in acidity of the cerebro-spinal fluid. the next shows the changes in expired carbon dioxide and oxygen using constant artificial ventilation, and the last column shows changes in carotid and femoral flow of blood.

An analysis of the second and third columns, showing changes in acidity of the arterial and venous blood and changes in pulmonary ventilation, will give a notion of the relation of pulmonary ventilation to blood acidity. The administration of carbon dioxide turns both the arterial and venous blood more acid, and pulmonary ventilation increases. Readministration of room air is accompanied by decreased acidity and a return to normal ventilation. Intravenous injection of sodium carbonate turns both the arterial and venous blood more alkaline, and pulmonary ventilation subsides. With recovery the blood swings back to normal acid values and ventilation increases. These observations fall into line with the older theory of respiratory control through the free hydrogen ions of the arterial blood, but the injection of sodium bicarbonate reveals an important exception. As the arterial and venous blood turn alkaline, pulmonary ventilation increases, and as the blood again swings, acid ventilation diminishes.

The next exception is found in the experiments on mechanical asphyxia with the lungs filled with room air, and with the lungs filled with pure oxygen. The gases were administered by artificial ventilation in volume sufficient to establish apnœa. The pump was then stopped. The changes in acidity of the arterial blood and the onset of respiratory movements were recorded. When the lungs were filled with room air, the acidity of the arterial blood increased slowly and respiratory movements came on rapidly. But when the lungs were filled with oxygen the acidity increased rapidly and the onset of increased respiratory movements was delayed. Another common exception to the theory of respiratory control by the free hydrogen ions in the arterial blood is seen in the effects of low alveolar oxygen, whether administered by artificial ventilation or by normal ventilation. In either case both the arterial and venous blood turn alkaline and ventilation is increased. On readministration of room air the blood turns acid and ventilation subsides. The intravenous injection of sodium cyanide may turn the arterial and venous blood either acid or alkaline, depending upon whether artificial ventilation is administered or whether ventilation is normally controlled. In either case respiratory movements are increased. The effects of cyanide may then be said to support and contradict the blood acidity theory of control.

Whether ventilation is artificial or normal, hæmorrhage turns the arterial blood more alkaline, at the same time increasing respiratory movements. Reinjection turns the arterial blood more acid and depresses ventilation. On the other hand, if we follow the changes in acidity of the venous blood, we find the relation between blood acidity and ventilation reversed. The increased acidity of the venous blood during hæmorrhage is associated with increased respiratory effort, and the decreased acidity following reinjection is associated with decreased respiratory effort.

To summarize, in three procedures there is a direct relation between the hydrogen-ion concentration of the arterial blood and pulmonary ventilation: the administration of carbon dioxide, sodium carbonate, or cyanide during constant artificial ventilation. In five procedures there is an inverse relation between the hydrogen-ion concentration of the arterial blood and pulmonary ventilation: intravenous injection of sodium bicarbonate, mechanical asphyxia, administration of a gaseous mixture low in oxygen, intravenous injection of cyanide during normal ventilation, and hæmorrhage. In all procedures other than hæmorrhage the directional changes in the acidity of the arterial and venous blood are the same. In hæmorrhage the directional changes are opposite. Despite the fact that the arterial blood, which flows more slowly through the lungs, is more thoroughly ventilated, both with respect to oxygenation and elimination of carbon dioxide, the highly alkalinized arterial blood, after passing through the tissues comes out more acid than normal. Obviously the slackened circulation through the tissues has resulted in greater acidification. This supports the view that acidity of the tissues may perhaps be a more important factor than acidity of the blood in the control of ventilation.

To follow up this view we may turn again to procedure number one. Though the administration of carbon dioxide turns both the arterial and venous blood more acid, the increase in acidity of the arterial blood is more abrupt and extensive than that of the venous blood. This suggests that carbon dioxide has passed from blood to tissues, so that the tissues have served as buffer to the blood. The slower return to normal acid values on the venous side on readministration of room air suggests the passage of accumulated carbon dioxide from the tissues back to the blood. The evidence is in favour of increased tissue acidity from administration of carbon dioxide. This is supported by the changes in hydrogen-ion concentration of the cerebro-spinal fluid. During the administration of carbon dioxide the fluid turns distinctly acid, and with the readministration of room air its acidity diminishes.

Effects of Sodium Carbonate.

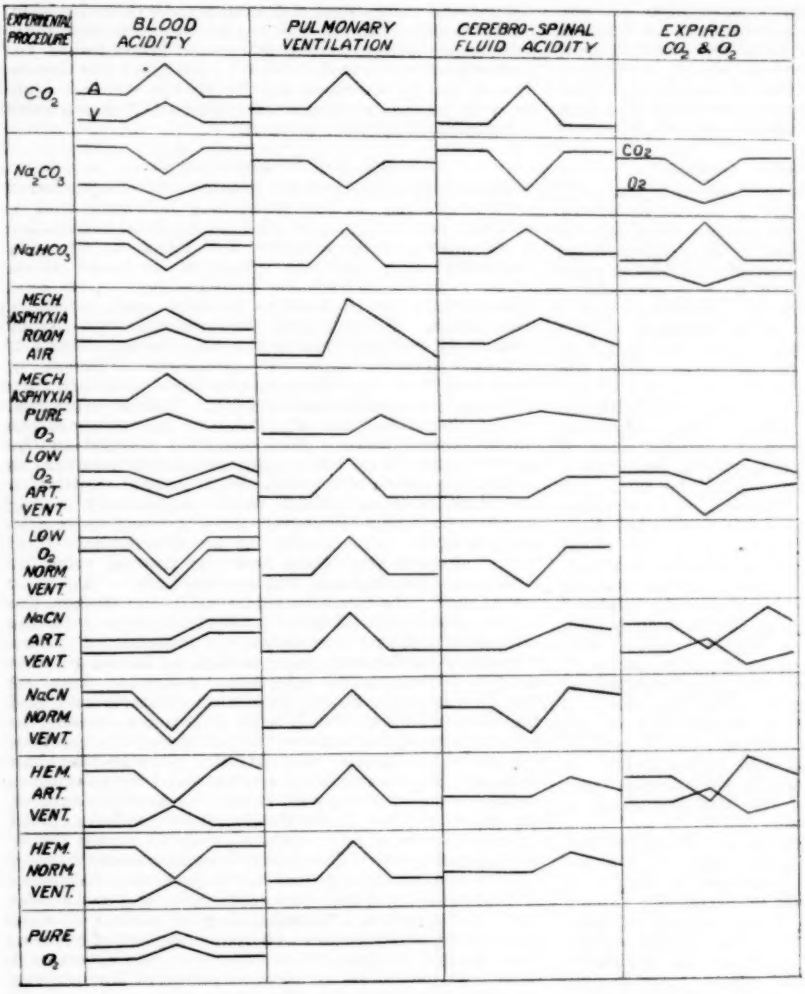
When sodium carbonate is injected the picture is reversed. The presence of a free base capable of combining with carbon dioxide and lowering the carbon dioxide pressure in the blood leads to a greater movement of carbon dioxide from the tissues to the blood. A comparison of the acidity curves of the arterial and venous blood indicates the absorption of carbon dioxide by the blood as it passes through the tissues, for the increase in alkalinity of the arterial blood is relatively great compared with the increase in the venous blood. The decreased hydrogen-ion concentration of the cerebro-spinal fluid suggests the passage of carbon dioxide from the brain-tissue fluids into the blood.

The possibility of movement of free base from the blood into the tissue fluids should be also considered. In this respect the experiments on expired gases are helpful. Constant artificial ventilation is administered during pneumothorax; changes in expired carbon dioxide and expired oxygen indicate changes in carbon dioxide elimination and oxygen consumption. Upstroke on either record indicates an increasing content of either gas in the expired air. With a continuously administered gas, such as room air, upstroke on the carbon dioxide record indicates increasing carbon dioxide elimination, and upstroke on the oxygen record indicates decreasing oxygen consumption. Where the oxygen content of the gas is changed by administration, special analysis of the oxygen record is required to determine the changes in oxygen consumption. Inspection of the diagram of changes in expired gases on the injection of sodium carbonate during the administration of room air shows two changes, decreased elimination of carbon dioxide by the lungs and increased oxygen consumption. The coincidence of increased oxidation and decreased elimination of carbon dioxide is satisfactory evidence of the lowering of the carbon dioxide tension of the blood and accelerated movement of carbon dioxide from the tissues into the blood. It is, therefore, conceivable that the brain may have turned less acid,

primarily as a result of increased diffusion of carbon dioxide. On this point the experiments on sodium bicarbonate seem more to the point, but in any event the depressed ventilation appears to be associated with decreased acidity of the tissues.

The stimulating effects of intravenous injection of sodium bicarbonate constituted one of the major difficulties in arriving at a satisfactory theory of respiratory control, and led to theories of the specific action of the HCO_3 ion and of carbon dioxide. In attempting to explain the action of sodium bicarbonate on a purely acid mechanism, account was taken of the semi-permeability of cell membranes, of the freedom of movement of carbon dioxide and undissociated carbonic acid, and of the effects of sodium bicarbonate on the carbon dioxide buffer system of the blood. Assuming first that the addition of sodium bicarbonate affects the equilibrium of the buffer system with an increase in the freely diffusible carbon dioxide and carbonic acid, a back pressure of carbon dioxide is immediately established, retarding the normal movement of acid from tissue to blood. Increasing tissue acidity should result, granting that the semi-permeability of the cell membranes acts as sufficient barrier to the increased metallic kations. It is obviously extremely difficult to perform the direct experiment of following changes in acidity of a neurone of the respiratory centre with injection of sodium bicarbonate, but inasmuch as the cerebro-spinal fluid is separated from the blood by membranes which appear to possess selective action, it seemed worth while to determine the effects of intravenous injection of sodium bicarbonate on the acidity of the fluid. Increased acidity was found to occur. If we may infer that similar changes in acidity occurred within the brain cells, the respiratory response may be explainable on a strictly acid basis and the specific action of the HCO_3 ion abandoned.

The effects of massive injection of sodium bicarbonate on expiratory gases support the theory of the acid mechanism of respiratory control. It will be seen, for example, that the carbon dioxide elimination is enormously increased. Oxidations are also increased but not in proportion to the carbon dioxide elimination. In one experiment the expired carbon dioxide was increased from 4·34 per cent. to 9·10 per cent., a total increase of 4·76 per cent. The associated increase in oxygen consumption amounted to only 1·6 per cent. These figures correspond to an increase in the expiratory quotient from 0·91 to 1·42. While several factors probably contribute to this high expiratory quotient, the results are in line with the postulate that the addition of sodium bicarbonate to the blood may momentarily drive the carbon dioxide in two directions—into the tissues and into the alveolar air. The view that the tissues may temporarily be turned more acid by the injection of base is thus upheld by the expired gas experiments as well as by the cerebro-spinal fluid experiments.



Mechanical Asphyxia.

In the mechanical asphyxia experiments, if we are justified in using the changes in acidity of the cerebro-spinal fluid as an index to the changes in acidity of the brain, we are forced again to conclude that the correspondence between blood and tissue acidity is uncertain. Inspection of the chart shows that mechanical asphyxia with the lungs filled with room air leads to a greater increase in acidity of the cerebro-spinal fluid than asphyxia with the lungs filled with oxygen, though the increase in acidity of the blood is considerably less. These acid-base relations in tissue and blood are presumably explainable by changes in acid metabolism at the cells, and in disturbances in the transport and elimination of carbon dioxide due to a broken coördination of the dual function of hæmoglobin. The increased acidity of the cerebro-spinal fluid is probably a result of impaired oxidations and impaired transport of acid, with a resultant diffusion of fixed and free acid into the fluid. The smaller increase in acidity of the arterial blood with the lungs filled with room air is traceable to the alkaline effect of liberation of free base, which goes hand in hand with progressive reduction of oxyhæmoglobin. A highly reduced blood, heavily laden with acid, incapable of the normal liberation of oxygen and base at the

tissues, returns to the lungs with a small increment of carbon dioxide. Failure in oxidation at the lungs leads to retention of carbon dioxide by the blood. A highly reduced alkaline hæmoglobin is, therefore, in equilibrium with a relatively low alveolar carbon dioxide tension. During mechanical asphyxia with the lungs filled with oxygen a highly oxidised blood, lightly laden with carbon dioxide and capable of great liberation of oxygen and alkali at the tissues, returns with a large increment of carbon dioxide. Subsequent oxidation of the hæmoglobin at the lungs efficiently expels carbon dioxide. A well-oxidised hæmoglobin is in equilibrium with a high alveolar carbon dioxide tension. The high acidity of the oxidised hæmoglobin is thus indicative of an efficient transport of acid and suggestive of a correspondingly low acidity of the tissues. If this is true, the effects of mechanical asphyxia on respiratory movements with low and high alveolar oxygen pressure may also be placed on an acid basis.

Effects of Low Alveolar Oxygen.

Though the arterial and venous blood turn distinctly alkaline on the administration of low oxygen, the evidence points to a synchronous increase in acidity of the tissues. The major decrease in the hydrogen-ion concentration of the blood is a result of a higher state of reduction of the hæmoglobin with a consequent liberation of free base. This is established by a comparison of the effects of administration of the same gaseous mixture by constant artificial ventilation and by normal ventilation. In the latter, where the animal augments its ventilation, the alkalinity of the blood may be only moderately increased by additional washing-out of carbon dioxide. The increased alkalinity of the blood with normal administration of low oxygen may, therefore, be largely a result of a chemical change which is not related to improved elimination of carbon dioxide. To be sure, a reduction of oxyhæmoglobin at the tissues is conducive to a lowering of the carbon dioxide pressure in the blood and the maintenance of an effective diffusion gradient for the movement of carbon dioxide from the tissues. However, unless the blood is subsequently oxidised and freed of its acid at the lungs so that reduction may be repeated at the tissues, a highly reduced and alkalinised blood will not augment the elimination of carbon dioxide, but will rather lead to a retention of acid. To these conditions must be added the effects of impaired oxidations on the acid metabolism of the tissues, which complete the picture of a broken coördination of the dual function of hæmoglobin. In accordance with theory, not only is the transport and elimination of acid hampered but the formation is momentarily augmented as well.

Indirect evidence for impairment of oxidations and increased tissue acidity during a period of lowered alveolar oxygen is found in the changes in acidity of the blood on readministration of room air during constant artificial ventilation. There is a distinct acid overshooting of the blood. The arterial and venous blood turn more acid than normal and gradually return to the preadministration values. Apparently acid has been accumulating in the body though the blood was turning more alkaline. As further evidence we may note the effects of lowered alveolar oxygen on the hydrogen-ion concentration of the cerebro-spinal fluid. Lowered oxygen increases the acidity, and readministration of room air leads to recovery. The expired gas experiments add to the picture. With the administration of low oxygen the elimination of carbon dioxide falls off at once. If acid is being formed at the usual rate it must thus necessarily be retained. Readministration of room air promptly leads to increased carbon dioxide elimination, which gives way to overshooting and recovery. The carbon dioxide overshooting is accompanied by supernormal oxygen consumption, indicating impairment of oxidations during the period of lowered alveolar oxygen. It is interesting to note the correspondence of the blood acidity and the expired carbon dioxide curves with the administration of low oxygen and readministration of room air by artificial ventilation.

Though the evidence is favourable for increasing acidity of the tissues during the administration of low oxygen by artificial ventilation, it is not as decisive with normal ventilation because of the added washing-out of carbon dioxide from augmented ventilation. The acidity records of the blood under these conditions show decidedly less acid overshooting, particularly with short administrations of low oxygen; but when the administrations are prolonged and severe, distinct acid overshooting invariably occurs, despite the fact that ventilation may be greater than normal. This is evidence for excessive formation of fixed acids in the tissues and subsequent diffusion into the blood stream, for it is difficult to see how the blood can remain more acid than normal during hyperventilation unless the buffer base is reduced by fixed acids from the tissues. The ultimate increased acidity of the cerebro-spinal fluid is further evidence of increased tissue acidity from lowered alveolar oxygen.

Effects of Sodium Cyanide.

Though the initial effects of intravenous injection of sodium cyanide on the blood may be either acid or alkaline, depending upon whether artificial ventilation is administered or whether ventilation is normally controlled, the ultimate effect is increased blood acidity. Here, as with low alveolar oxygen, the acid overshooting is definitely greater with artificial ventilation. Nevertheless, the fact that hyperacidity ultimately results, despite the alkalinising effects of hyperventilation, indicates excessive diffusion of fixed acid from the tissues to the blood, which in turn indicates increased tissue acidity. This is supported by the ultimate effects of cyanide on the acidity of the cerebro-spinal fluid. With artificial ventilation the cerebro-spinal fluid turns acid, and slowly recovers as oxidations return to normal. With normal ventilation the cerebro-spinal fluid may temporarily swing alkaline with the blood, but later it turns more acid than normal. The lymph, as an intermediate fluid lying between the blood and the tissues, must be influenced by chemical changes in both. Knowing the abrupt reduction of oxidations in the tissues, the sudden reduction of carbon dioxide pressure in the arterial blood, and the rapidity of diffusion of carbon dioxide, it is not surprising to find an initial alkaline change with cyanide injection. Likewise, knowing the increased anaerobic formation of lactic acid and the slow diffusion of this acid, it is not surprising to note a delayed increase in the acidity of the cerebro-spinal fluid, although ventilation may be greater than normal. That oxidations are impaired by cyanide is well known and is apparent in the curves of the expired gas experiments. Immediately after injection expired oxygen increases, but with recovery decreases below the normal level. This delayed hyperconsumption of oxygen is a common sequel to the preceding reduction of oxidations, and may be looked upon as a compensatory phenomenon. Overshooting of carbon dioxide elimination accompanies hyperconsumption of oxygen. The changes in gaseous metabolism thus correspond with those produced by administration of low oxygen followed by readministration of room air. The curves of expired carbon dioxide agree in contour with the blood acidity curves when cyanide is given during constant ventilation.

The expired gas experiments in which the expiratory quotients were followed seem to indicate more explicitly the changes in acid metabolism occurring with cyanide administration and recovery. For example, during the early period of administration the expiratory quotient increases, and during recovery it may fall below normal. In one experiment the expiratory quotient rose from 0·98 to 2·02 and subsequently fell to 0·91. In another experiment it rose from 0·93 to 1·39 and fell during recovery to 0·82. The increased expiratory quotient during the initially decreased expiratory exchange is believed to agree with an increased anaerobic production of fixed acid. The subsequent decrease in the expiratory quotient is believed to agree with retention of carbon dioxide and with the dual mechanism of oxidative and non-

oxidative removal of lactic acid. It is interesting to note that the expiratory quotient may be reduced below normal during the recovery period, when carbon dioxide elimination may be considerably higher than normal. This marks a period of relative retention which soon gives way to absolute retention of carbon dioxide.

The changes in tissue acidity produced by cyanide and low oxygen are probably very similar, though the mechanism producing them is somewhat different. In each there appears to be an altered acid metabolism in favour of increased anaerobic production of acid, combined with a break in the coördination of the dual function of hæmoglobin. With cyanide administration the coördination is disturbed by a more or less permanently oxidised state of the hæmoglobin. Alkali is neither liberated in abundance at the tissues nor recalled in the lungs, for the tissues are unable to use the oxygen with which they are provided. With low alveolar oxygen the coördination is disturbed by a more or less permanently reduced state of the hæmoglobin. The tissues are unable to obtain the oxygen which they could use.

Effects of Hæmorrhage.

Whereas the same directional change in acidity of the arterial and venous blood is the rule for most procedures, hæmorrhage is characterised by opposite changes in hydrogen-ion concentration. That this difference is attributable to the effects of volume flow of blood is clearly demonstrated by the fact that the arterial blood turns alkaline with hæmorrhage when constant artificial ventilation is administered as well as when augmented ventilation is permitted during normal control. Obviously the greater movement of air under normal conditions is not the sole contributing cause of the increased alkalinity of the arterial blood. It stands to reason that, if the degree of ventilation is a function of the amount of air to which a unit volume of blood is exposed in a unit of time, the ventilation of the blood may be increased by either augmenting the movement of air, or decreasing the flow of blood. The large increase in alkalinity of the arterial blood with constant artificial ventilation graphically illustrates the significance of volume flow of blood in the acid-base equilibrium of tissues and tissue fluids. Just as volume flow of blood through the lungs determines the alveolar and arterial carbon dioxide pressure, so does the volume flow of blood through the tissues determine the tissue and venous acid pressures. If decreased flow of blood through the lungs permits a more complete elimination of carbon dioxide per unit of blood, decreased flow of blood through the tissues must entail a greater accession of acid per unit of blood. Even granting an unmodified acid metabolism, a diminished flow must lead to increased venous acid pressure with a damming-back of acid in the tissues. But adding to this the usual picture of impaired oxidations with its associated disturbances in the dual function of hæmoglobin, increased acidity of the tissues is more clearly indicated. Certainly, if the arterial blood which has just been turned 0·3 to 0·4 pH more alkaline as a result of hæmorrhage will leave the tissues distinctly more acid than normal, there is little room to doubt that the tissues have also turned more acid. In the expired gas experiments hæmorrhage reduced the oxygen consumption and carbon dioxide elimination, and reinjection of blood elicited typical carbon dioxide overshooting, associated with hyperconsumption of oxygen. A comparison of the curve of expired carbon dioxide and the arterial acidity curve will show the same correspondence as in the cyanide and low oxygen experiments with constant artificial ventilation. The increase in acidity of the cerebro-spinal fluid after hæmorrhage supplements the evidence for increased tissue acidity with decreased flow of blood and decreased acidity with increased flow of blood.

Conclusion.

Our experiments establish a lack of correspondence between blood acidity and pulmonary ventilation on the one hand, and indicate a correspondence between tissue acidity and pulmonary ventilation on the other hand. Granting that this relation is a causal one, we have advanced one step in the solution of the problem of respiratory control, but the exact mechanism by which acidity operates cannot be predicted until the problem of automatic discharge of rhythmically active cells is better understood. This, admittedly, is a fundamental biological problem of the widest scope. If the rhythmic discharge of the respiratory neurones is a membrane phenomenon, dependent on the structure and composition of the membrane and the nature of the fluid on each side of it, the relation between changes in the acidity of the immediate cell environment and changes in ventilation should be analysed as carefully as the data will permit. Up to the present no direct method has been employed for studying changes in acidity of the tissue fluids in the brain. The closest approach to the problem has been the study of changes in acidity of the cerebro-spinal fluid. If the assumption is correct that the cerebro-spinal fluid reflects changes in acidity of the tissue fluids in the brain, and if acidity is the primary factor in respiratory control, then changes in hydrogen-ion concentration within the cell rather than in the immediate cell environment is the predominant factor. This is indicated in the experiments on the effects of administration of low oxygen and of cyanide on the acidity of the cerebro-spinal fluid. When low alveolar oxygen is administered by artificial ventilation, the cerebro-spinal fluid may show no immediate change or may turn distinctly acid, but when the oxygen is administered by normal ventilation the change is sharply alkaline, yet ventilation is markedly stimulated under both conditions. When sodium cyanide is administered during artificial ventilation the cerebro-spinal fluid turns acid, but if it be injected during normal ventilation the change is alkaline. Respiration is stimulated in either procedure. While these results by no means indicate that acidity of the immediate cell environment is without effect upon the behaviour of the respiratory centre, they do suggest that changes in the acidity of the interior of the cell is a more determinant factor. However, the elaboration of this phase of the subject must remain in abeyance until further data are obtained.

The results here described represent the work of a number of individuals. The problem of respiratory control was an outgrowth of the studies on blood volume and tissue nutrition begun at the University of California in which E. Blair, C. S. Capp, F. Foote, C. A. Moyle, and R. T. Trotter participated. The work was continued at Washington University, where a theory of respiratory control was outlined and then at the University of Michigan, where several methods and procedures were developed to test the theory. C. S. Capp assisted in the preliminary experiments on the continuous registration of pH changes with the manganese dioxide electrode. These uncompleted experiments were continued the following year and the method applied to animal experiments with the help of A. B. Hertzman. The method for the continuous electrometric registration of volume flow of blood was developed with the help of D. W. Bronk, and the animal experiments continued with the help of D. W. Bronk, T. Bernthal, and N. Codero. The electrometric methods of registering changes in expired oxygen and carbon dioxide were developed with the help of D. A. McGinty, who also participated in the later animal experiments. In this brief summary of our work no effort is made to cover the work of others.

BEQUEST OF A BODY.—The late Mr. H. Reeve Everitt, solicitor, of Lowestoft and Norwich, left £100 "and my body to Dr. Arthur Cleveland, in order that he may arrange an autopsy thereon for the benefit of science, and I have left to him the before-mentioned legacy of £100 expressly to cover the cost of this operation and for a meeting of such members of the medical fraternity as he may choose to invite to discuss such unusual points o professional interest as may arise."

THE SERUM TREATMENT OF CUTANEOUS ANTHRAX.

WITH NOTES ON DIAGNOSIS.

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IN dealing with the treatment of cutaneous anthrax most modern text-books, whilst recognising the value of anti-anthrax serum and recommending its use, still advise surgical excision of the local lesion. During the past four and a half years the cases enumerated in the following table, which have come under my care, have been treated solely with serum, without any resort to excision of the "malignant pustule," the only local application being eusol fomentations.

Results of Serum Treatment.

No.	Age and sex.	Days ill on admission.	Site of lesion.	Serum injected in c.cm.	Number of injections.	Result.
1	42 F	5	Left cheek	400	5	Recovery
2	40 M	5	L. forearm	360	5	"
3	20 F	3	L. upper arm	80	3	"
4	40 M	2	Angle of jaw	220	4	"
5	22 M	5	Back of neck	645	6	"
6	49 M	4	R. forearm*	840	7	"
7	23 M	4	Lower lip	360	4	"
8	49 M	4	Neck, behind ear	370	5	"
9	22 M	3	Back of neck	270	3	"
10	34 F	3	L. cheek	180	3	"
11	28 M	2	Below angle of jaw	360	4	"
12	30 M	6	Back of neck	130	1	Died.†
13	26 M	3	" "	270	3	Recovery
14	24 M	2	L. cheek	160	2	"
15	45 M	2	Back of neck	210	3	"
16	39 M	3	R. cheek*	410	5	"
17	18 M	4	L. cheek	295	4	"
18	20 M	5	Side of neck	330	4	"
19	19 M	2	L. cheek	260	3	"
20	18 F	1	L. great toe	180	2	"
21	34 F	3	Side of neck	270	3	"
22	30 M	1	L. wrist	90	2	"
23	52 M	3	Back of neck	510	5	"
24	19 M	3	L. forearm	240	3	"
25	51 M	4	"	210	2	"
26	41 M	3	R. wrist	270	3	"
27	50 M	7	Neck, middle line, in front	180	1	Died.‡
28	44 M	4	L. cheek	320	3	Recovery
29	19 F	4	R. upper arm	450	4	"
30	61 M	5	R. cheek*	600	2	"
31	28 M	4	R. gluteal fold	330	2	"

Except on four occasions, when an intramuscular injection was made, the serum was given intravenously.
* Two foci. † 15 hours after admission.
‡ 4 hours after admission.

With few exceptions the intravenous route has been chosen for the injection of serum by reason of its prompt therapeutic effect, a distinct advantage in so rapidly ingravescent a disease as anthrax.

The usual glass funnel and tube apparatus is used and the gravitation method of injection is employed, the serum, &c., being warmed in a water bath at 100° F.

The possibility of the occurrence of anaphylactic symptoms must be borne in mind and, if considered desirable, a preliminary test injection of 0·5 c.cm. of serum subcutaneously, half an hour before the major injection, may be made. My experience has led me to omit this test injection, and to begin with 50 c.cm. sterile normal saline solution to which five drops of serum have been added. This is allowed to flow into the vein slowly. In the absence of any untoward signs the concentration of the mixture in the funnel is gradually increased until pure serum is passing. One of the veins in the ante-cubital space is usually chosen for the injection, though in fat subjects the dorsal veins of the hand are sometimes easier of access.

At all times, however, when giving an intravenous injection of serum, it is wise to have at hand a hypodermic syringe, ready charged with atropin sulph., gr. 1/100, for use in case of sudden respiratory spasmodic changes. Twice, in the series under review, have sudden cyanosis and threatened respiratory spasm caused some degree of alarm. In these circumstances the intravenous method has been abandoned and the serum given intramuscularly. Often the patient will complain of a feeling of oppression and heat, and may perspire; but these symptoms usually disappear as confidence increases with subsequent injections.

Dosage and Effects of Serum.

As in other therapeutic sera, no precise rule can be enunciated, but early administration, and that with a generous hand, is the first element of success. As will be seen by a reference to the table, my choice is definitely tending to a large initial dose and quick repetition of the injections, as circumstances demand.

Three factors which operate in each case are: (1) The duration of the disease when the case first comes for injection—i.e., the day of disease; (2) the degree of toxæmia; and (3) the site of the lesion.

Day of Disease.—The earlier the serum is given the more quickly and easily is the advance of the local lesion and the resultant absorption of toxins arrested. Up to three days, generally speaking, the disease is controllable, but after this the treatment rapidly becomes more anxious and prolonged.

Degree of Toxæmia.—The personal resistance of the patient has an undoubted bearing on this, and possibly there may be some variability in virulence of the infecting organism also, since it is noticeable that one case appears to develop signs of toxæmia more rapidly than another, whilst, on the other hand, the effects of the serum are more quickly shown in some cases than in others. A putty-like pallor of the face, listlessness, low tension pulse, sighing respiration, unduly raised temperature, and restlessness alone or variously combined are ominous.

Site of the Lesion.—An anthrax infection within or near the anterior triangle of the neck is always closely attended by the possibility of the swelling and œdema involving the root of the tongue, the pharynx, or particularly, the larynx, and hence this area demands an early large dose of serum in order, as promptly as can be, to limit local inflammatory swelling. Similarly a lesion near the eyelids may by subsequent sloughing produce disfiguring contracture. It may be taken as a rough rule that the further away from the neck that infection is located, the less likely is trouble to be encountered.

The effects of the serum are evidenced locally in about 24 hours by a cessation of further inflammatory swelling, the formation of vesicles abates, the temperature may be somewhat lower, and the patient feels easier. Later the induration shows a slow though definite decline and the part is less swollen. Coincident with these changes the temperature and the pulse-rate fall, usually by a lysis covering two, three, or more days, according to the severity of the case. Meanwhile the vesicles have ruptured or collapsed, and the central dark necrotic zone shows around itself a narrow ring of inflammatory "casting off" reaction. It is my practice to continue giving serum daily until the temperature has definitely fallen to normal level. In passing, I would emphasise that a reliable and fully potent serum is essential to successful treatment in a condition so rapid in its progress as anthrax. In the cases here tabulated I have used the serum of three different makers, and of these I must state that for potency and prompt antitoxic response that supplied by Messrs. Parke, Davis is definitely superior to the others.

The further behaviour of the cases, once serum treatment has been completed, is remarkably free from serious incident. Serum rashes, alone or accompanied by arthralgia and pyrexia, as might be expected after the administration of large amounts, were comparatively severe when they occurred, but a fair proportion of the patients escaped entirely.

The healing of the local focus varied in length of time from 14 days to 35 days, according to the area of the initial lesion and the mass of the resulting slough. Except in one case (No. 29) the final scar was comparatively unnoticeable. One man (No. 14), a mild case, reported to me that he had frontal neuralgia for three months after his scar had healed.

Case No. 29, mentioned above, showed a striking reinfection on the fourth day of treatment—i.e., after the intravenous injection of 300 c.cm. of serum. The primary focus was typical and about 30 mm. in diameter, and was situated at the inner side of the insertion of the right deltoid. At first the patient appeared to be making good progress, but on the fourth day there appeared a new crop of vesicles and subjacent inflammation covering an area of about 100 sq. cm., extending almost to the elbow flexure. In due course a large superficial slough resulted. The subsequent ulcer was successfully overcome by skin-grafting.

Included in the series are two fatal cases. Both came late under treatment. One patient died 15 hours after admission, and the other, moribund on arrival, died four hours afterwards.

Diagnosis.

From the foregoing it is claimed that the early administration of anti-anthrax serum in sufficiently large doses has a marked curative effect in the disease.

The recognition of cutaneous anthrax at an early moment is by no means easy, and consequently appropriate treatment may be seriously delayed. The city and port of Liverpool have the largest trade in wool, hair, and hides in the world; in the district there are many tanneries, &c. Hence the local medical practitioners are to some extent on the alert for the possibility of anthrax in the human subject.

An angry "pimple" or papule, without pus, surrounded by a disproportionately large inflammatory areola, especially if it is situated at or near a "rubbed" area, such as the collar or coat-cuff region, should arouse suspicion. Rapid increase of inflammatory redness and swelling, and the formation of a small dark centre with a ring of vesicles should demand instant action. Pain of an acute type is not always present. The term "pustule" is, in my view, unfortunate and misleading. I have not yet seen a "malignant pustule" in which, in the early pre-sloughing phrase, there was any pus evident. The fully developed lesion is strikingly characteristic, showing the brown, purple, or purple-black centre, the ring of yellowish vesicles, and the red, hard, surrounding cellulitis, involving an area extending out of all proportion to the primary focus of infection. The occupation of the patient—e.g., butcher, farmer, tanner, dock labourer, or worker in hair, wool, or allied trades—may give a hint. The likelihood of infection from shaving brushes has now, fortunately, been minimised.

Discovery of *Bacillus anthracis* by examination of a film made from a swab taken from the part is, of course, conclusive evidence. Kneading of the lesion or rupture of a vesicle gives enough serous exudate with which to make a swab and culture. Usually the large Gram-positive anthrax bacillus is easily found, but I have met cases in which, though locally and constitutionally the evidence left no doubt as to the diagnosis of anthrax, the organism could not be found in a direct film, its presence being proved only by culture or animal inoculation. In any doubtful circumstance the wisest course is to give serum. The bacteriological confirmation can then be undertaken without any harmful delay.

Amongst other conditions sent to this hospital as anthrax are simple pustules, boils, carbuncles, insect bites, cellulitis, and accidental vaccinia.

Thanks to the efforts of Dr. A. A. Mussen, the medical officer of health, employers of wool and hair workers are with increasing frequency sending to the Fazakerley Hospital any person who may show even a slightly suspicious "spot" for examination. With the same object propaganda by means of posters about the docks and allied warehouses and factories in which hides, &c., may be handled, will render those concerned more alive to the benefits which follow early recognition and treatment of anthrax infection.

In the past year I have given anti-anthrax serum, empirically, in 10 c.cm. doses, subcutaneously, as a prophylactic, to persons definitely exposed to anthrax infection, in nine instances. These included sanitary inspectors, farmers, and slaughterers who handled the carcasses of cows which had died of anthrax. Although skin scratches or other open wounds were present, none of the men injected developed the disease.

In conclusion I gratefully acknowledge the permission of Dr. Claude Rundle, Medical Superintendent of the City Hospitals, Fazakerley, to describe the cases quoted.

THE TREATMENT OF EPIDERMOPHYTOSIS OF THE TOES (MANGO TOE)

AND CERTAIN OTHER FORMS OF EPIDERMOPHYTOSIS BY A FUCHSIN PAINT.

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EPIDERMOPHYTOSIS of the toes is extremely common in the tropics, where it is known by a variety of names—mango toe, Hong-Kong toe, Cantlie's foot-tetter, &c. In recent years the condition has become quite common also in countries situated in the temperate zones, including this country. It is caused, as proved by Sabouraud and Whitfield, by the same fungi that cause ordinary dhobie itch (tinea cruris, tinea inguinalis), the principal species of these fungi being *Epidermophyton cruris*, Castellani, 1905 (synonym *E. inguinalis*, Sabouraud, 1907), and *Epidermophylon rubrum*, Castellani, 1909. Both these fungi were found and described by me in Ceylon in cases of dhobie itch.

The treatment is most difficult as every tropical practitioner and every dermatologist can well testify; it is easy enough to induce a temporary disappearance of the symptoms, but a complete eradication of the infection is in many cases almost impossible, the condition usually recurring after a period of apparent cure. Three years ago, after carrying out a fairly large number of experiments, I introduced in the treatment of the condition a fuchsin paint which has given me very satisfactory results.

Formula of the paint.—The paint has the following formula: saturated alcoholic solution of basic fuchsin 10 c.cm., 5 per cent. aqueous carbolic acid solution 100 c.cm. Filter and add boric acid 1 g. After two hours add 5 c.cm. of acetone; two hours later add resorcin 10 g. The paint should be kept in a dark coloured bottle with glass stopper.

The paint is the ordinary carbol-fuchsin used in bacteriological laboratories for staining tubercle bacilli, to which 1 per cent. boric acid, 5 per cent. acetone, and 10 per cent. resorcin have been added. As a matter of fact simple carbol-fuchsin alone gives good results, but the addition of the boric acid and the acetone seems to enhance its action and make it more penetrating, and resorcin certainly increases its efficacy in most cases. It is applied to the affected parts with a small wad of cotton-wool or a small sponge every day, in some cases several times a day, or every other day or twice a week; if very acute eczematoid symptoms are present it may be diluted with the same amount of water, but usually it may be safely applied undiluted even to most acute eczematoid conditions provided they are of true epidermophytic origin. Certain cases—very exceptional—seem to answer better when the resorcin is omitted from the paint.

Epidermophytosis interdigitalis pedum (mango toe).—In all acute and chronic cases of epidermophytosis

interdigitalis pedum the result is generally satisfactory, especially so in cases with secondary pyogenic infection. In the past, when the associated pyogenic infection was very heavy and there was present diffuse redness with small pustules and abrasions, I used, at first, to keep the parts moist with a saturated boric lotion or a boric resorcin lotion, for two or three days before starting the fuchsin paint. Now, however, in every case, I use the fuchsin treatment immediately with good results. With regard to the details of the treatment,—viz., frequency of applications, length of treatment, &c.—each case has, of course, to be treated on its own merits, but a safe general rule is to apply the paint freely two or three times daily for a week, then give three days' rest, then apply the paint again once or twice daily, for another week. In some cases the treatment has to be carried out for a much longer period of time.

Other types of epidermophytosis. Mycotic pruritus ani et vulvæ.—In addition to epidermophytosis of the toes I found the paint useful in certain other types of epidermophytosis. As I have stated elsewhere a fairly large number of cases of pruritus ani and pruritus vulvæ are of mycotic origin; very often we are dealing with a latent epidermophytosis with superadded saccharomycetic, cryptococcal, monilial, and bacterial infections. In a number of these cases the paint acts well.

Illustrative case.—Mrs. A. (London) complained for several weeks of unbearable vaginal and anal pruritus. On examination an eczematoid condition of the labia majora and of the perianal region was present; the patient complained of pruritus also in the labia minora and in the clitoris. The paint was applied freely not only to the external surface of the labia majora but also to the internal surface, and also to the labia minora and clitoris; at first diluted with equal part of water, then neat as it caused no smarting. The application was done at first every other day, then twice a week, then once a week. Within three weeks the condition was completely cured. From this case, before starting the treatment, an epidermophyton (*E. rubrum*) was grown and, in addition, a monilia and various bacteria, also a most peculiar organism which I was uncertain at first how to classify as certain forms of it resembled a cryptococcus, others a thick bacillus. I have described it elsewhere under the name *Bacillus multiformis*. (Proc. Soc. Exper. Biol. and Med., 1928, xxv., 539.)

Epidermophytosis cruris (inguinalis); epidermophytosis corporis.—While most cases of tinea cruris (dhobie itch) answer well to the usual routine treatment by salicylic-benzoic acid ointment (Whitfield's ointment) consisting of salicylic acid grs. xxx., benzoic acid grs. xxx., and vaseline 1 oz., or my older salicylic-sulphur ointment (ac. salicyl. grs. xxx., sulphur præc. grs. xxx., vaseline ad ℥i.) in a certain percentage of cases the result is unsatisfactory, and in some of these I have found the paint useful. As a method of routine, however, the use of ointments is much simpler and preferable.

Cases of epidermophytosis simulating moist eczema.—In these the paint seems to be very successful, especially when the lesions are on the arms, hands, and feet.

Epidermophytic pompholyx.—The deep, tense vesicles should be opened and then the paint applied frequently all over the affected region, usually the fingers and palms of the hands. In this type of epidermophytosis the paint does not answer so well as in the pure eczematous type. In certain cases it is of advantage—provided there are no moist eczematoid lesions associated with the pompholyx—to apply frequently for two days before starting the fuchsin treatment a lotion containing menthol or thymol grs. ii.–v., ac. salicylici grs. xxx.–℥i., resorcin grs. xv.–xxx., spir. rect. ℥ii.–iv., aq. dest. ad ℥vi.

Post-epidermophytosis pruritus.—In previous publications I have called attention to the occurrence of post-epidermophytosis pruritus—viz., cases in which after the usual routine treatment all the objective symptoms of epidermophytosis disappear but the pruritus remains for weeks and months. The pruritus may be of different origin: (*a*) although the clinical signs have disappeared the mycotic infection is still present; (*b*) over-treatment and mild hypersensitivity to the various antimycotic ointments; (*c*) nervous origin; in some highly strung individuals the pruritus remains long after the infection has disappeared. In the first group of cases the application of the carbol-fuchsin paint will be found useful.

Conclusion.

A paint consisting of carbol-fuchsin 100 c.cm., boric acid 1 g., acetone 5 c.cm., resorcin 10 g., gives very satisfactory results in the treatment of epidermophytosis of the toes (mango toe), both in the acute type and chronic type with presence or absence of secondary bacterial infections. It is useful also in certain other forms of epidermophytosis, especially in cases showing signs of moist eczematous dermatitis, the very cases in which salves are contraindicated, as in such cases, as a rule, they increase the inflammatory symptoms. With regard to ordinary dhobie itch (tinea cruris, tinea inguinalis) the paint acts well, but the routine treatment by Whitfield's salicylic-benzoic ointment or my old salicylic-sulphur ointment is much simpler and to be preferred.

A disadvantage of using the paint is the deep red colouring of the skin, but patients who have suffered from epidermophytosis interdigitalis pedum for years and have tried all sorts of treatment do not object to it. So far I have not come across—among over a hundred patients—a single case of hypersensitiveness to the paint, but no doubt if this method of treatment should become generalised, such hypersensitive individuals will be found, and therefore at first the paint should be applied with care and in small amount.

Reference.—Castellani: Gehrmann Lectures on Fungi and Fungal Diseases, delivered before the University of Illinois, Chicago, 1926, and published in the Archives of Dermatology and Syphilology, October, November, December, 1927; January, February, and March, 1928.

CULTIVATION OF VACCINIA VIRUS WITHOUT TISSUE CULTURE.

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THE set of experiments which form the subject of this note was made during the course of systematic investigations on the cultivation of filterable viruses. Indications had been obtained that it would be desirable to determine whether the virus of vaccinia would multiply under the conditions of culture to be described.

Technique.

Commercial vaccine lymph was inoculated into the testes of an adult rabbit. After four days the testes were markedly swollen and hæmorrhagic. They were removed and ground in sand and m/50 phosphate, pH 7·6. The mixture was centrifugalised and the supernatant fluid (about 5 c.cm.) was used for the primary inoculum. It was free from bacteria as tested by aerobic broth culture.

Titrations were made by inoculating 0·2 c.cm. of a series of dilutions intradermally into the skin of the back of adult rabbits. The diluting fluid throughout was m/50 phosphate, pH 7·6.

The method of preparing and testing cultures was as follows. Blood was withdrawn from a hen and after it had clotted the serum was collected. The hen was killed with chloroform and ether, and the kidneys, which were removed aseptically, were minced finely with scissors. Into a flask was put 0·66 c.cm. (approximately) of minced kidney and 1·33 c.cm. of inoculum diluted 1 in 6·6 with Tyrode's solution. The mixture was allowed to stand in the cold room for four hours. Then were added 12 c.cm. of Tyrode's

solution and 6 c.cm. of hen's serum. The final dilution of the inoculum was thus 1 in 100. The mixture was distributed in amounts of 2 c.cm. into Carrel's tissue culture flasks,[1] type D, which were incubated aerobically at 37° C., without caps. The cultures were tested after various periods of incubation by grinding the whole of the contents of each flask with sand and centrifugalising. The supernatant fluid was controlled for the presence of bacteria by aerobic broth culture and titrated as outlined above.

Experimental.

Expt. 1. Titration of the Primary Inoculum.—The first titration was made at the time the inoculum was prepared. The highest dilution tested, 1 in 500, produced a lesion. A second titration, made after the inoculum had been stored in the ice-chest for ten days, resulted in a dilution of 1 in 2500 producing a lesion. A dilution of 1 in 12,500 caused no reaction.

Expt. 2. First Series of Cultures of Virus.—After storage for six days in the cold room the primary inoculum was used for the first series of cultures. The titre of the inoculum was 1 in 2500 (Expt. 1), and its dilution in these cultures was 1 in 100. Cultures were titrated in duplicate. The results are summarised below.

After incubation for 1 day, 1 in 125 pos.*
" " 3 days, 1 in 625 pos.*
" " 5 " 1 in 625 pos.*
" " 7 " 1 in 3125 pos.*

(Pos. = vaccinia lesion. Neg. = no vaccinia lesion.)
* Highest dilution tested.

Expt. 3. Second Series of Cultures of Virus.—The inoculum for this series was the supernatant fluid from a culture of Expt. 2 which had been incubated for five days. It was free from bacteria as tested by aerobic culture in broth, and had been in the cold room for four days before it was used for this experiment. The dilution of the inoculum in these cultures was 1 in 100. Cultures were titrated in duplicate.

After incubation for 1 day, 1 in 5 pos., 1 in 25 neg.
" " 5 days, 1 in 625 pos.*
" " 8 days, 1 in 625 pos.*

* Highest dilution tested.

A dilution of 1 in 625 in this series represented a dilution of 1 in 625×10^4 of the primary inoculum.

Expt. 4. Third Series of Cultures of Virus.—The inoculum was the supernatant fluid of a five-day culture from Expt. 3. It had been in the cold room for two days, was free from bacteria as tested by aerobic culture in broth, and was diluted 1 in 100 in setting up the cultures. Cultures were again titrated in duplicate.

After incubation for 1 day, 1 in 5 pos., 1 in 25 neg.
" " 5 days, 1 in 625 pos.*
" " 8 days, 1 in 625 pos.*

* Highest dilution tested.

A dilution of 1 in 625 in this series represented a dilution of 1 in 625×10^6 of the primary inoculum.

Expt. 5. Fourth Series of Cultures of Virus.—The inoculum was the supernatant fluid of an eight-day culture from Expt. 4. It was not stored before use and was diluted 1 in 100 in setting up the cultures. Cultures were titrated in duplicate.

After incubation for 1 day, 1 in 25 pos., 1 in 125 neg.
" " 5 days, (*a*) 1 in 125 pos., 1 in 625 neg.
" " 5 days, (*b*) 1 in 625 pos.*

* Highest dilution tested.

A dilution of 1 in 625 in this series represented a dilution of 1 in 625×10^8 of the primary inoculum. Except for the five-day cultures in this experiment the results of titrating duplicate cultures were identical throughout. The supernatant fluid from the five-day cultures was free from bacteria as tested by aerobic broth cultures.

[1] Carrel, A.: Jour. Exper. Med., 1923, xxxviii., 407.

Expt. 6. Neutralisation of Primary Inoculum, Virus from Third and Fourth Series of Cultures and Lymph from Government Laboratory by Anti-vaccinia Serum.—Neutralisation experiments were made with anti-vaccinia rabbit serum. Virus was diluted with Tyrode's solution and divided into two parts. To one part an equal volume of Tyrode's solution was added and to the other an equal volume of anti-vaccinia serum. After the mixtures had stood for two hours at room temperature, 0·2 c.cm. of each was inoculated intradermally into the skin of a rabbit. The viruses tested and the final dilutions were as follows: (*a*) primary inoculum 1 in 50; (*b*) Government lymph 1 in 50; (*c*) supernatant fluid from an eight-day culture, Expt. 4, 1 in 5; (*d*) supernatant fluid from a five-day culture (*a*) Expt. 5, 1 in 5.

In each instance the virus in Tyrode's solution produced a lesion and no lesion resulted from the virus with serum.

Expt. 7. Had the Medium alone after Incubation an Adjuvant Effect on Infectivity of Virus?—Cultures were made as described except that they contained no inoculum. After they had been incubated for six days at 37° C. the contents of the flasks were put into a mortar and primary inoculum was added, so that it became diluted 1 in 100. The mixture was then treated as a culture—i.e., it was ground in sand and centrifugalised. The supernatant fluid was titrated and compared with the titration of corresponding dilutions of the primary inoculum in Tyrode's solution. The titrations produced identical results. In each instance a dilution of the primary inoculum of 1 in 2500 caused a lesion; a dilution of 1 in 12,500 did not.

Discussion.

During four successive cultures vaccinia virus has increased approximately 25×10^8 times. There was also evidence of increase in comparing the titrations of cultures after incubation for one day and after incubation for five to eight days in Expts. 2, 3, 4, and 5. The experiments were not carried beyond the fourth series of cultures.

In comparing the results of this technique with the growth of vaccinia virus in tissue cultures it is of interest to note the uniformity of results obtained. Whereas only a varying proportion of tissue cultures give evidence of multiplication of the virus, we were impressed by the regularity of the results of titration of cultures in duplicate after incubation for from five to eight days, and also by the similarity of results in successive experiments.

In these cultures we were not able to detect any tissue growth; after 24 hours the small pieces of kidney had begun to disintegrate, and by the third day autolysis of the tissue was extensive.

We wish to express our thanks to Prof. J. C. G. Ledingham, F.R.S., who kindly provided the anti-vaccinia serum, and to Dr. F. R. Blaxall, who supplied some Government lymph.

VICTORIA INFIRMARY, NEWCASTLE-ON-TYNE.—The report of the work of this hospital for 1927 contains some remarkable figures. Since 1907 the number of in-patients has increased from 6445 to 13,806, of new out-patients from 32,444 to 130,352, of out-patient attendances from 93,244 to 383,464; operations last year numbered 14,523 as compared with 5678 in 1907. The waiting-list has been periodically reviewed, yet it still contained 1840 names. The abnormal growth in out-patients' attendances is causing the house committee to inquire into the possibility of curtailing some part of the work. The number of motor accident cases has increased by 138 to 1124, and the 572 beds available were inadequate throughout the year. At the end of the present month the infirmary will come into possession of the adjoining premises, until now occupied as an orthopædic hospital by the Ministry of Pensions, and the honorary medical and surgical staff have outlined a scheme for the adaptation of part of the premises as paying wards, but no decision has been reached. Meanwhile the appeal for £150,000 for extensions made last year is being pressed forward.

Clinical and Laboratory Notes.

A CASE OF GLIOSARCOMA OF THE RETINA IN A CHILD OF THREE.

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In the following somewhat rare case the patient was carried a distance of 30 miles, probably on foot, by the parents, from whom the history was elicited with difficulty as they were very ignorant and poor villagers.

A Hindu (Bengali) female child, aged 3, was first seen on March 17th, 1928. She had been born normal with perfect eyes, and there was no history of any injury. Four months

Child, front view. Note intact but over-stretched margin of eyelids formed into a ring. Note also two large circular fungating ulcers. The mother with plenty of milk was still suckling her only child at 3 years.

before admission her eyes had begun to "water"; then the left eye became red and, later, cloudy. The left eye was said first to have retracted for about a month; then it began to bulge.

When brought to hospital the child was so irritable that gr. 1/12th morphia had to be given hypodermically before examination, but the tumour did not seem particularly painful. The left eye was found to have been completely destroyed by an ulcerating tumour, the size of a lemon, protruding from the orbit and evaginating the palpebral conjunctiva. The eyelids were intact but greatly stretched. The tumour was firm and fleshy with a feeling of resilience. The child was otherwise normal and in fair condition (feeding on rice, &c., and still suckling from its mother). The right eye was sound and there were no signs of any secondary deposits elsewhere in the body, glands or otherwise.

Treatment.—Complete exenteration of the orbit, as far as possible in one piece, was performed under a general anæsthetic (A.C.E. and ether) on March 22nd. It was a difficult operation on account of tension of the orbital contents and the advisability of removal in one piece intact. The external canthus was slit to give greater freedom for extraction. No operating gloves were used. During the removal a cystic portion burst and a semi-fluid exuded in the form of soft, lumpy, glial contents of a crushed blackberry colour, suggesting degenerating tissue stained by blood. This came from the upper and medial quadrant of the tumour, slightly decreasing its volume and so facilitating extraction. The greater portion of the tumour was fairly firm. There was no invasion of the orbit and the periosteum was stripped clean everywhere up to the margin. The growth appeared to have extended backwards along the optic nerve to the base of the brain through the optic foramen, as the optic nerve was somewhat pulpy. The nerve was cut through as far back as possible. There was little bleeding of the stump, and this was controlled by hot saline flush and pressure pad, as artery forceps proved of little value. The redundant over-stretched eyelids were then trimmed and the cilial margins cut away. The orbit was packed with gauze soaked in acriflavine and liquid paraffin mixture.

The child had a reactionary post-operative temperature of 101° F. the same evening, which had dropped to normal the next day, rising again to 100° F. on the third day, and thereafter normal until an incidental attack of dysentery set in and passed off after treatment.

The first dressing was carried out under general anæsthesia on the third day, when the stump of the optic nerve was cauterised with pure carbolic acid and a ribbon gauze dressing of acriflavine and paraffin repeated. Thenceforward similar daily dressings of very light packing after irrigating with electrolytic chlorine were carried out for about 14 days, when acriflavine and paraffin were discontinued.

The child made much better progress than was expected considering the primitive aseptic and antiseptic conditions in a new hospital in the jungle 22 miles from the railway. The parents, against medical advice, took the child away 31 days after the operation, before the wound was healed or a skin graft had been attempted. Nothing has been heard since.

THE COOKING OF LIVER FOR THE TREATMENT OF PERNICIOUS ANÆMIA.

By C. E. Pollock, M.R.C.S. Eng.,
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Liver as usually cooked soon palls. Being myself an involuntary member of the "honourable company of liverers," and not relishing the prospect of having to eat the same preparation of liver four or five days a week, I set to work to find ways of converting our mainstay of life into an attractive item on the menu. I give the results obtained up to the present, and with further experience I hope to add to the list.

When cooking liver the following general rules should be observed:—

(*a*) Fresh ox liver is more effective than calf liver.

(*b*) The cooking should be short, and the temperature should be kept as low as possible—just sufficient to make the liver seem to have been cooked.

(*c*) No more fat should be used than is actually necessary for each dish.

(*d*) Grilling makes the liver tough.

(*e*) Only a little salt should be used in the cooking; more can be added when it is eaten.

(*f*) Any sweet flavouring, such as chutney, should be used sparingly.

Some Recipes.

Liver Sandwiches.—The following has been successfully used by friends for a child. Put the raw liver through a mincer and remove any fibrous parts. Spread the minced liver on thinly cut slices of bread and butter, or a piece of toast which has been split in two. In either case use little or no butter. Add pepper and salt according to taste, sprinkle it freely with fresh lemon juice, and a trace of grated onion. A few dabs of Bovril, or a thin layer of grated cooked ham improves the flavour. Finely chopped pickles may be used in place of ham.

Fried Liver.—Cut the liver into rather thin slices. Put a small quantity of butter, margarine, or a slice of not very fat bacon into the frying-pan and heat to low frying temperature. Cook gently for five to ten minutes to suit the individual's taste.

Dry Curry.—Slice the liver as above. Put into the frying-pan a little butter and a dessert spoonful of chutney with a squeeze of lemon juice. Heat this while stirring it to a low frying temperature. Roll the slices of liver in dry curry powder and place them in the pan. Cook gently for five to ten minutes.

Liver Purées.—(*a*) Prepare a white sauce. Stir in 6 oz. of grated raw carrot, if it is coarse, or, if young carrots are

obtainable, the same quantity finely chopped. Boil gently for a few minutes. Stir in the minced raw liver and let it stand for three minutes on the warm top of the stove, away from the flame.

(*b*) Prepare a brown gravy, using as little fatty substance as possible. Bring this to the boil, then move the pan away from the flame, and stir in the minced raw liver. Let it stand for three to five minutes. Green peas or finely sliced young carrots improve the flavour. Serve on toast.

(*c*) Prepare a breakfast-cupful of Bovril or Marmite. Bring it to the boil, stir in the minced liver, and let it stand for a couple of minutes on the top of the hot stove. This is very useful when the liver is required at short notice.

Liver Soups.—Prepare a breakfast cupful of any of the following soups: tomato, veal broth, chicken, or rabbit broth. Many others, such as potato soup, game soup, milk and celery soup, make a pleasant variation. Bring the soup up to the boil. Take the pan off the fire, stir in the minced raw liver, and let it stand for a few minutes.

Minced Liver on Toast.—Prepare a tasty gravy flavoured with a sauce such as A.1 or Harvey's. Chop the liver and cook gently in the gravy for three minutes, spread it on the toast, and serve hot.

Liver and Eggs.—Minced raw liver may be beaten up with milk and eggs and served as scrambled eggs. An omelette may be filled with minced liver cooked slightly in a tasty gravy.

Liver Roll.—Mince together 12 oz. of liver, 6 oz. of beef (preferably steak), and 6 oz. of rather lean bacon. Add a trace of finely chopped onion. Mix a teacupful of bread-crumbs with the minced liver and bacon. Beat up one egg and stir it into the liver mixture, flavouring the whole with a little tomato sauce. Wrap it in grease-proof paper, and cook in a steamer from one to one and a half hours. Let it get cold and eat it as a sandwich, or in place of cold meat. This is a useful preparation when travelling.

Risotto.—Boil some rice in the ordinary way. Cut the liver into dice of about half an inch, and cook in a savoury sauce, tomato for preference. Place the cooked rice in a hot dish, making a hollow in the middle. Put the liver into this. If preferred, the liver may be sprinkled with lemon juice and lightly fried. In this case a well-flavoured sauce should be served to pour over the rice. Cooked macaroni may be used in place of rice.

Stuffed Potatoes.—Bake or boil two large potatoes in their skins. When cooked cut off the upper third. Scoop out one-third of the potato. Into the space thus formed put minced liver, previously cooked in brown gravy and well seasoned with ketchup and lemon juice. Mash the removed potato, and use some of it to form a cap to the liver. Place a thin slice of bacon over the top, and put them into a hot oven for three minutes.

Chicken and Liver Fricassee.—Minced liver mixes well with chicken fricassee prepared in the ordinary way.

Toad-in-the-Hole.—Liver may be used in this dish in place of beef. When making the batter stir in a teaspoonful of ketchup. Cold cooked liver and potato salad made with mayonnaise is excellent for an occasional change, but contains too much oil to be used frequently.

With experience other recipes will suggest themselves to the interested cook, and the anæmic brother will bless her ingenuity.

A CASE OF MULTIPLE COMPOUND FRACTURE OF THE SKULL, WITH RECOVERY.

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In his village of Sandawe a man had a quarrel with his wife; on the pretence of cutting wood, he took her out into the bush, and there attempted brutally to murder her. The woman was brought into hospital with six wounds on her head, five of which were complete compound fractures of the vault of the skull; at first appearance the head seemed almost severed from her body, the injuries were three days old, the head wrapped in a filthy blood-stained native cloth, was covered with mud, the several muscles and torn scalp sloughing, and a general septic state prevailed. Under these conditions the prognosis seemed hopeless; nevertheless the patient did live, and attended the court three months subsequently. Besides a scalp wound 3 in. long and reaching to the bone, there were five complete compound fractures of the vault of the skull; these wounds were inflicted by a panga. The fractures were: one left temporal, one frontal, one right parietal, one left parietal, and one fracture of occipital bone 5 in. long, and 1¼ in. gap; all these fractures communicated with the surface of the brain, and in all cases the cerebral meninges were exposed. It would seem almost miraculous, considering the anatomical relations of the middle meningeal artery, especially its anterior branch, also the temporals externally, that these vessels could have escaped rupture with ensuing fatal hæmorrhage.

Public Health Services.

REPORTS OF MEDICAL OFFICERS OF HEALTH.

The following are some of the 1927 statistics of five English, one Welsh, and two Scottish counties:—

Name of county and estimated mid-year population.	Birth-rate.	Death-rates per 1000 of the population.					Death-rates per 1000 births.		
		All causes.	Tuberculosis.	Cancer.	Respiratory diseases with influenza.	Heart disease.	Infant mortality.	Diarrhœa, &c., under 2 years.	Maternal mortality from childbirth.
Surrey .. .. (792,300)	14·2	10·7	0·71	1·81	2·0	1·6	46	2·0	3·0
Warwickshire .. (377,900)	17·3	11·2	0·76	1·36	2·1	1·5	66	3·8	2·9
East Sussex .. (268,200)	12·6	12·4	0·67	1·66	2·0	2·3	44	1·8	5·0
Northamptonshire (215,000)	14·4	11·8	0·89	1·48	2·2	1·9	51	1·9	5·1
Cumberland .. (216,130)	17·2	13·6	0·85	1·40	2·8	2·0	81	6·7	5·4
Breconshire .. (61,150)	16·7	12·8	0·98	1·04	2·8	2·0	79	5·8	7·8
Aberdeen* .. (107,224)	21·2	13·4	0·83	1·55	2·1	2·0	73†	3·9	3·9
Fife* .. .. .. (110,689)	19·2	11·8	0·60	1·11	2·4	1·3	86	4·2	7·5

* Extra burghal or landward area. † Including the burghs, except Peterhead and Fraserburgh.

Surrey.

Dr. T. Ruddock West, deputy M.O.H., describes the continued attention given to the river Wandle. The rapid building up of the districts in this valley has given rise to engineering and legal problems owing to the sudden increases in the volume of the river after the fall of rain on the much larger proportion of impermeable surface. As the swollen river subsides the oil is deposited and gives rise to offensive smell and unsightly conditions. The Carshalton section of the river, which was subject to much chemical pollution, is now free from pollution from trade wastes and sewage, while the stretch of the river from the female orphanage to Beddington Park has been cleaned and the velocity of the stream much improved. During the year there were 149 notifications of puerperal fever and pyrexia with six applications for a second opinion and eight for admission to hospital. It is thought that the facilities provided will be more used when the scheme becomes widely known. The number of cases admitted to maternity homes under the Council's scheme shows a steady increase. Thus the admissions during the last five years were 44, 54, 104, 160, and 183.

The whole-time chief veterinary officer appointed by the council took up his duties in July. Pending

arrangements for the periodical inspection of all dairy herds notifications of milk containing tubercle bacilli or streptococci of bovine mastitis are investigated. It is frequently found that although the notifications received may refer to only one farm, the sample contains other milk purchased by the vending farmer. As the result of 11 "outside" notifications of tuberculous milk four animals were dealt with under the Order, and of five others suffering from tubercle four were slaughtered by the owners and one died during the investigation. In seven cases no confirmatory evidence by microscopical and biological tests of tuberculous infection was obtained. In the case of the four milk samples containing streptococci four animals were discovered suffering from mastitis, and the owners' attention was drawn to the fact that it was an offence to sell such milk.

The number of blind persons on the register is gradually increasing. At the end of 1924 there were 523 and at the end of 1927, 744. The council subscribe £100 per annum to the National Library for the Blind and in return the library supplies books and music to blind persons in Surrey. The school report shows that the parents of 219 children objected to routine medical inspection. In 40 cases the objection was withdrawn after explanation and in 46 the inspection schedule was completed by a private practitioner. The school nurses also act as health and tuberculosis visitors. The cost of installing drinking fountains of special type to take the place of the drinking vessels (mostly enamelled iron mugs) used in common by the scholars is considered by the council to be prohibitive. Great success is claimed for the system instituted in June, 1925, by which contacts of certain infectious diseases remain at school under the supervision of the school nurse instead of being excluded. Owing to the epidemic of influenza which swept the county during January and February the number of days of school closure compares unfavourably with the previous year. In the case of several schools, after meetings of the parents at which the procedure was explained, immunisation of children against diphtheria has been practised. Nearly 1000 children have been immunised. There are now within the county 73 minor ailment, 31 dental, and 27 eye clinics. When one more additional dental surgeon has been appointed in 1928 dental treatment will be available for the school-children at every age. Under the orthopædic scheme, which included seven centres, 729 children received 12,222 treatments.

Warwickshire.

Dr. A. Hamilton Wood reports that after an absence from the county since July, 1925, small-pox appeared in epidemic form during the last quarter. There were 55 cases notified chiefly in Nuneaton, Foleshill, and the Atherstone and Coventry rural districts. At the time of writing the report the disease was under control. The outbreak, says Dr. Wood, would have been even more limited if the offer of vaccination had been generally accepted. The disease was usually of a mild type, but in some cases led to disfigurement. There was an outbreak of enteric fever causing 22 cases in Southam. The source of the outbreak was a well contaminated with sewage, as evidenced by bacteriological examination and the discovery of leakage from a drain. There were 12 notifications of encephalitis lethargica in the urban and 12 in the rural districts and 16 deaths.

Some improvement is reported as to river pollution. The condition of the Tame is likely to be improved by the efforts of the Upper Tame Joint Committee and the extension of the bio-aeration process at the Birmingham Tame and Rea works. The pollution by paper mills is to be reduced by the introduction of machinery which will extract fibre from the residue, to be used again instead of its being discharged as waste. The state of the Avon is improved by better treatment at the Rugby works. Coventry, which is in a difficult position, owing to the fact that the volume of the effluent in dry weather is equal to that of the river, is contemplating new works at an estimated cost of £226,000. It is thought that the ten miles stretch of the river between Baginton and Warwick may, as the result of these schemes, become once more capable of maintaining fish life. The policy of the county council is to investigate all cases of tuberculous milk reported from outside, and in addition to take 100 bulk samples. There were 31 outside notifications, which resulted in 12 cows being slaughtered under the Tuberculosis Order. Of 85 bulk samples examined biologically three were found to be tubercle-infected. During the year about 2000 swabs were examined from diphtheria cases and contacts, but only five virulence tests were carried out. It is thought that full advantage will be taken of the virulence test in future when its extreme usefulness is appreciated.

The orthopædic scheme comprises five clinics, but another clinic is required in the north of the county to complete the scheme. Of 52 cases of puerperal fever and pyrexia a second opinion was asked for in six cases, and 12 cases were removed to hospital. If the case is treated at home the nurse-midwife takes charge and is compensated for the loss which she incurs by handing over her normal cases to other midwives. The higher death-rate and infant mortality as compared with the previous year was accounted for by the influenza epidemic, which was responsible for 211 deaths as against 85 in 1926.

East Sussex.

Dr. A. G. R. Foulerton gives the result of following up tuberculous milk samples notified by outside authorities from Sept. 1st, 1925, to Dec. 31st, 1927. During these 28 months the notifications numbered 31, and as a result 34 farms were inspected and 14 cows dealt with under the Tuberculosis Order. A table shows the average infant mortality in the county for the four years 1924–27 as 44·7 and the figures for the three preceding six-year periods as 80·2, 70·9, and 53·8. During the same four periods the infant mortality for England and Wales was 119, 100·8, 82·5, and 72·2. The deaths from tuberculosis during the year numbered 181 and the number of cases on the revised register is 1027. In April, 1928, there were only four parishes, with a total population of 1463, without the services of a district nurse. At the end of the year there were 25 registered maternity homes in the county. Dr. J. R. Dingley, the medical superintendent, reports that an orthopædic visiting surgeon has been appointed for Darvell Hall Sanatorium. Dr. Dingley is impressed with the satisfactory results obtained by artificial pneumothorax in suitable cases, and favours its more extensive use for early cases. Occasionally he finds sanocrysin of benefit. In furtherance of the scheme for occupational therapy a workshop has been equipped for the patients and is in the charge of a skilled joiner, an ex-patient.

Northamptonshire.

Dr. L. Meredith Davies reports an epidemic of influenza between the third week in January and the first week in March, during which time 139 school departments were closed for varying periods. A somewhat excessive prevalence of paratyphoid fever, chiefly in the Kettering neighbourhood, during the latter half of the year was exhaustively investigated and was thought to be associated with a carrier employed at a large bakery. One case of small-pox was imported from Durham. The occupations followed by the new cases of tuberculosis do not suggest that the incidence of tuberculosis in the boot and shoe industry is unduly high. Artificial light treatment at the Wellingborough dispensary appears to give the best results in the case of tuberculous glands with discharging sinuses and is somewhat less beneficial for lupus, while its value for pulmonary disease is doubtful. Dr. Davies discusses the failure to get early cases of phthisis under treatment and is inclined to favour the establishment of preventoria as in Germany and America, the adoption of the "Grancher" system, and the more extensive use of open-air schools, both day and residential. The notifications of ophthalmia neonatorum numbered

28, of which 23 were treated at home and 5 in hospital, including 2 babies born in the hospital. One case of total blindness resulted, but the circumstances of this case are not given.

The orthopædic scheme now comprises five clinics based on the Manfield Hospital. The 14 notified cases of puerperal fever were investigated. Ten of the cases were treated in hospital and special nurses were provided for two. Particulars are also given of the 27 notified cases of puerperal pyrexia, 7 of which were treated in hospital, and for 3 of which special nurses were provided. There were no applications from practitioners for antistreptococcal serum or for bacteriological examinations. Nine complaints of tuberculous milk were received from the L.C.C., but only two infected cows were discovered and dealt with under the Order. In several districts veterinary inspection is in force. Fifteen tuberculous cows were discovered by the Kettering inspector, of which two were not in milk and in three the disease was "not advanced." All 15 were dealt with under the Order. Four tuberculous cows were found by inspection in the Wellingborough district, one in Oundle, and none in the other five districts.

Cumberland.

Dr. F. H. Morison states that many of the recommendations for improvements and extensions made in the years 1924 and 1925 have been carried out. As regards future developments, he recommends two which will not be expensive. The first is a subsidised bed for children at the Cumberland Infirmary, which might be used for operations for rupture, squint and eye conditions, skin diseases, and for observation in obscure cases. The second is the provision of a bacteriological laboratory in the county, which would not be an additional expense but take the place of laboratory work now done for the county in Manchester and London. Other more costly needs which he presses are: 1. The appointment of a woman medical officer to coördinate maternity and child welfare work, to enable new centres to be opened, and to develop antenatal work among expectant mothers. 2. Additions to the dental staff. At present there is only one dental surgeon and one nurse, and half of the school-children receive no dental treatment at all. In order to provide an efficient dental scheme five dental officers and five nurses would be required, but the appointment of a second dental officer and nurse would at least enable urgent cases all over the county to receive prompt attention. 3. The provision of an open-air school, or at least the retention of beds in such a school, or in a seaside convalescent home. 4. Provision for the isolation of advanced cases of pulmonary tuberculosis and of beds for observation purposes. 5. The establishment of some such scheme as the Grancher system for child contacts of open tuberculosis. 6. The establishment of clinics and dispensaries at Arlecdon, Frizington, and Aspatria, and the provision of clinic treatment, perhaps by a caravan, for a large part of the east of the county. Dr. Morison also presses for the energetic operation of the Housing (Rural Workers) Act of 1926 by the full coöperation of the county council with the local authorities.

Breconshire.

Dr. Herbert Davies records an epidemic of small-pox in the Brynmawr district. The first case was notified in the beginning of May, and 59 cases were notified during the year with no deaths. The epidemic was more severe in Monmouthshire and Glamorganshire. The county council subsidise the district nursing associations and in return the nurses, who also act as midwives, perform the duties of school nurse and health visitor. A scheme is in force whereby midwives attending cases more than three miles from their home are paid an allowance of 3*d.* per mile after the first three miles for each day of their attendance, but no payments were made under this scheme during the year. As in most districts the death-rate from respiratory diseases in 1927 was increased by the prevalence of influenza.

Aberdeen.

Dr. Harry J. Rae reports that the scheme begun in 1925 for the immunisation of children against diphtheria and scarlet fever has been continued with vigour. Up to the end of February about one-third of the school population, 8500 children, had been tested and 7000 of them actively immunised. As regards results, during the period mentioned 1333 cases of scarlet fever were notified. The cases notified included 21 of the tested children, in 7 of whom the disease appeared within a month of the last inoculation, while four others were discharged from hospital as not having had scarlet fever. The net result, therefore, was 10 mild cases of scarlet fever among the 7000 immunised children. During the same period 257 cases of diphtheria were notified, only two of whom had received preventive inoculations. Two separate outbreaks of milk-borne paratyphoid fever occurred, both in the Deer district. The first began in the end of May and caused about 32 cases in the burgh of Peterhead. The mother of the family, which carried out the work of the dairy farm, was found to be a carrier. The husband made application for compensation owing to loss of his work. The authorities did not think compensation could be legally made under Section 164 of the Public Health (Scotland) Act, 1897. The claim was ultimately settled by finding employment for the man under the road surveyor of the Deer district. In this outbreak the evidence pointed to the fact that the milk was infected on one occasion only. The second outbreak, also of paratyphoid B, occurred in November. The actual carrier in this case was not clearly demonstrated, and the milk appeared to have been infected on one or, at most, on two occasions.

There were 346 notifications of pneumonia. Institutional treatment is encouraged, and there is plenty of accommodation at the city hospital or at Woodend hospital. Removal is recommended up to the fourth day provided the patient's condition is good and there is no cardiac embarrassment. Many practitioners in the county favour domiciliary treatment, one objection to which is that the patients return to work too soon. In eight cases special nurses were supplied through the health department. Dr. Rae thinks that the extensive adoption of the Housing (Rural Workers) Act would do more to meet the housing shortage in the county than any preceding housing Act, and points out that this Act applies to burghal areas and to the dwellings of persons other than agricultural labourers. Routine inspection by the county veterinary inspector discovered 69 suspect cows, of which ten had tuberculosis of the udder.

Fife.

Dr. G. Pratt Yule draws attention to the steady decline, year by year, of both the deaths from and the notifications of tuberculosis. The tuberculosis officer, Dr. G. McGillivray, thinks that the risk of case-to-case infection in a family has been greatly lessened by education. Most of the cases in Fife come from one- and two-roomed houses. Nevertheless, out of 241 new cases of tubercle in 1927 only 14 were contacts. In 36 others some kind of a family history of tuberculosis was obtained, but none of "living in contact." In 191 cases there was no family history of tuberculosis. Some years ago the state of affairs was quite different, when windows were seldom opened and no precautions taken with regard to coughing or sneezing and the disposal of sputum. Kirkcaldy is the only one of the four districts which continues to add to its housing programme. Dunfermline has discontinued owing to the state of the coal trade. Cupar and St. Andrews have contented themselves with subsidising private enterprise. All the four districts have adopted approved schemes under the Housing (Rural Workers) Act, but only four applications under this Act were received in 1927. There are nearly 6000 dairy cows in the county, and in 1927, the first completed year of regular inspection, was carried through by the county veterinary surgeon, Mr. R. G. Anderson.

MENTAL HOSPITAL REPORTS.

THE *West Sussex County Mental Hospital, Graylingwell*, near *Chichester*, has had an unusual influx of patients and is now 47 over the statutory accommodation, which is for 800. For the moment the most urgent need is for female beds, but during the last few months the admissions have been chiefly males. Of the 153 admissions 48 were aged 60 or more, and many of them were quite hopeless. Nevertheless there was a recovery-rate of 30·7 per cent. The general health was good, except for a mild epidemic of influenza, two cases of chicken-pox, and three of typhoid. The death-rate was 7·54 per cent. Dances and cinema performances take place weekly and a wireless apparatus is to be installed. Eight nurses and three attendants obtained their M.P.A. certificate during the year. Thirty of the 37 pages of the report are purely statistical.

The *Dorset County Mental Hospital* had 880 patients on the books at the end of the financial year and is considering plans for extension, although this figure shows a small diminution in the number of women patients. The recovery-rate is 48·22 per cent., rising to 68 per cent. if cases "discharged relieved" are included. The death-rate was 6·47 per cent. The general health was very good and the tuberculosis incidence has been halved. Although there are typhoid carriers in the hospital there has been no epidemic sickness of any kind except influenza in the spring. The laboratory has carried out over a thousand routine investigations and has also initiated research into the acetic anhydride or Boltz test and Buscaino's silver nitrate reaction. A "leucocytic survey" was made of all patients towards the end of the year, with a view to detecting focal sepsis. Acetonuria was found to have no significance in mental disease. Of 13 cases of general paralysis treated with tryparsamide, three have gone back to work, three are much improved, and four have died. Seven showed much mental inprovement. Occupational therapy is a new departure in this hospital and is already producing most excellent results; the department is self-supporting, for the handicraft work finds a ready sale. The out-patient clinic is held weekly at the Dorset County Hospital. A solarium for the men patients has been completed and various other alterations have been carried out in order to bring the hospital up to modern standards. The operating theatre is now in use. Patients are allowed to wear their own clothes and two wards on each side have open doors. Seventy-seven men and 14 women have full parole. Eight more nurses obtained the M.P.A. certificate during the year, and it is interesting to note that 28 members of the staff have more than 21 years' service to their credit.

The *Devon County Mental Hospital* records, in an illustrated report, a year of activity among its 1211 patients. To relieve congestion, 41 chronic harmless patients were removed to the care of local authorities. The recovery-rate was 36·65 per cent., but the figure for the private patients alone was 47 per cent., The death-rate was 9 per cent., the cause being verified by autopsy in 67·8 per cent. of cases. There has been a steady increase in the routine work of the laboratory, and 1860 investigations are listed. Blood films of patients who have had ultra-violet light treatment are being investigated. The consulting surgeon performed 21 operations and the dental surgeon examined 453 patients, including all new admissions. The ophthalmic surgeon saw 60 patients and prescribed glasses for 36. Definite benefit is being obtained from the ultra-violet ray installation. Five men with general paralysis were treated by induced malaria and three of them were discharged; one became worse. The out-patient clinic in Exeter treated 34 patients during the year. The new fruit garden supplied patients with 640 lb. of raspberries. Eighty-nine patients have had daily parole within the estate and 57 more have been allowed into the village and on walks. There has been no abuse of the privileges. The Hospital Fire Brigade won a prize at the National Fire Brigades' Association demonstration at Exmouth. The list of entertainments for patients occupies three and a half pages of small type; 15 of the 25 cricket matches were won by the hospital eleven. The handicrafts occupy a very large number of patients. Every effort is made to impress on probationer nurses that they come to the hospital to be taught and must go through a course of training and examinations just as general nurses do; 31·8 per cent. now have their M.P.A. certificate.

The *Stafford Mental Hospitals Board* houses just over a thousand patients at its Stafford Hospital, 943 at Burntwood, and 1134 at Cheddleton.—At *Stafford* the recovery-rate was 40 per cent. and the death-rate 7·62 per cent. The deficiency in sleeping accommodation has been partially relieved by the completion of a new annexe for tuberculous male patients and the use of the Isolation Hospital for men convalescents. A reception hospital is planned. The laboratory research has been hindered by the illness of one of the medical officers, but routine work goes on as usual and investigation has been continued into the usefulness of venom hæmolysis as a means of diagnosis. Patients are sent home on trial and have parole in the grounds, but not beyond. Forty-six male and 10 female nurses are certificated or registered. Ultra-violet ray treatment is giving good results.—At *Burntwood* the recovery-rate was 24·34 per cent. and the death-rate 9·63 per cent. The hospital is overcrowded and there is urgent need for an admission block. There were 88 cases of influenza, three of typhoid fever, and two fatal cases of dysentery, the source of which has been sought in vain. Vita-glass has been fitted in the men's sun room and has proved well worth the expense. Violet-ray and continuous bath apparatus are to be provided. Trial and parole are allowed to a number of patients. Forty-nine nurses are certificated or registered.—At *Cheddleton* there is the same overcrowding and there is urgent need for verandahs, X ray apparatus, and admission and convalescent blocks. The increase in the number of cases of dementia præcox and general paralysis continues. Malarial treatment for the latter is giving great satisfaction. Fourteen patients died of tuberculosis, although only one could be diagnosed on admission. Dysentery continues to cause anxiety, and careful search has not revealed the source of infection. The medical superintendent speaks trenchantly of the need for more nurses and of the difficulties of work in an out-of-date building with inadequate financial resources. Parole is granted to a number of patients, and three wards are administered on the open-door system. Twenty-six per cent. of the women and 60 per cent. of the men nurses are certificated or registered. The staff includes a visiting orthopædic sister, an electro-therapeutic sister, and a schoolmistress.

The *Joint Counties Mental Hospital* at *Carmarthen* housed 655 patients at the end of 1927, and had a recovery-rate for the year of 27·9 per cent. The death-rate was 11·39 per cent. One baby was born in hospital, and the mother has since recovered. There was a heavy epidemic of influenza in the spring and 21 cases of diarrhœa and 6 of tuberculosis were notified. The dental surgeon visited weekly and examined 200 patients. He found very little caries, but a good deal of gum trouble. The hospital lacks a number of facilities for treatment commonly regarded nowadays as indispensable. For instance, there is no electric-supply and, consequently, X rays, violet rays, and electric baths are impossible. The water-supply is inadequate, but the sewage has now been connected up with the town drains. The visiting Commissioners complain of the state of the sanitary annexes, of the darkness of the workroom and kitchen, of carelessness in storing poisons, and in keeping clinical records, and of the absence of verandahs, and of any attempt to keep the patients either employed or amused. They remark: "There

is an excellent pathological laboratory which has not been used for some years. . . . We hope that due regard will be paid . . . to the desirability of appointing a medical man with some knowledge, experience, and interest in this field of work."

At the *Glamorgan County Mental Hospital* at *Bridgend* there is overcrowding to the extent of 133 on the male side, and plans have been approved for a new reception block and other buildings. There were 1933 patients in residence at the end of 1927. The recovery-rate for the year was 31·1 per cent., and the death-rate 8·9 per cent. General paralysis accounted for most of the deaths, but disease of the heart and blood-vessels came next in order. The cause of death was verified by autopsy in 80 out of the 172 cases. A baby was born and the mother recovered. The general health was good, save for influenza and three cases of dysentery. The surgeon was not called on for any major operation, but the dental surgeon saw over 400 patients and performed 1408 extractions under local anæsthesia. Seventy patients were sent out on trial, ten with money allowances, and a good deal of parole is allowed on the male side, but none on the female. Twenty-one nurses gained their M.P.A. certificate during the year.

The *Monmouthshire Mental Hospital* at *Abergavenny* had 1158 patients at the end of 1927. The recovery-rate was 36 per cent. and the death-rate 5·2 per cent.—the lowest ever recorded at this hospital. The rate among the women was as low as 3·9 per cent. This speaks well for the efforts made in a hospital which, as a building, lacks many modern amenities. Central heating has been installed and one of the wards on each side is being converted into an admission ward with an open verandah and a hydrotherapy room. The general health was good except for influenza, and the institution is now free from dysentery. The visiting surgeon performed three operations during the year and the dental surgeon visited weekly. A number of patients have parole, and efforts are made to find occupation for all of them. Three more nurses have obtained their certificate.

The *Down County Mental Hospital, Downpatrick*, illustrates its report with many photographs of the buildings. There were 756 patients on the books at the end of the year. The recovery-rate was 46·2 per cent. and the death-rate 6·9 per cent. There were 44 vacancies, accommodation having been increased by the new nurses' quarters. The farm continues to be a pecuniary asset as well as providing excellent occupation for the patients, who are mainly drawn from an agricultural population. The increase in the number of entertainments and recreations continues, and the medical staff investigate cases thoroughly and individually. The more elaborate laboratory work is carried out in Belfast and London; last year an epidemic was averted by the prompt recognition of a "carrier" colitis. More than half the patients are usefully employed. About a hundred men go outside the walls every day and as many women once a week. The dental surgeon visits weekly, and there are physicians and surgeons on the consulting staff. Nine more nurses have gained their certificate, bringing the total to 54.

INFECTIOUS DISEASE IN ENGLAND AND WALES DURING THE WEEK ENDED SEPT. 8TH, 1928.

Notifications.—The following cases of infectious disease were notified during the week:—Small-pox, 123 (last week, 102); scarlet fever, 1790; diphtheria, 931; enteric fever, 108 (last week, 122); pneumonia, 436; puerperal fever, 38; puerperal pyrexia, 102; cerebro-spinal fever, 3; acute poliomyelitis, 17; encephalitis lethargica, 29; continued fever, 3; dysentery, 8; ophthalmia neonatorum, 102. No case of cholera, plague, or typhus fever was notified during the week.

The following counties each notified 3 or more cases of enteric fever:—London, 23; Devon, 3; Essex, 12 (of which Colchester 6); Hertford, 3; Lancaster, 6; Middlesex, 5; Southampton, 3; Surrey, 6; Sussex East, 4; Yorks West Riding, 3; Denbigh, 3. The total of 108 includes 39 cases of paratyphoid fever, of which 13 were notified in London and 5 in Surrey.

The number of cases in the Infectious Hospitals of the Metropolitan Asylums Board on Sept. 11th–12th was as follows:—Small-pox, 9 under treatment, 2 under observation; scarlet fever, 1552; diphtheria, 1444; enteric fever, 105; measles, 120; whooping-cough, 247; puerperal fever, 14 (plus 7 babies); encephalitis lethargica, 72; poliomyelitis, 2; "other diseases," 22. At St. Margaret's Hospital there were 17 babies (plus 10 mothers) with ophthalmia neonatorum.

Deaths.—In the aggregate of great towns, including London, there was no death from small-pox, 4 (0) from enteric fever, 14 (2) from measles, 5 (0) from scarlet fever, 17 (6) from whooping-cough, 17 (3) from diphtheria, 120 (39) from diarrhœa and enteritis under two years, and 18 (2) from influenza. The figures in parentheses are those for London itself.

The fatal cases of enteric fever were reported from Bristol, Stockport, Burnley, Newcastle-on-Tyne, and Tynemouth. Of the 12 fatal cases of measles 3 were reported from Birmingham, Belfast reporting 4 in the same week. There was a large increase in the number of deaths from diarrhœa, of which Liverpool reported 10; Birmingham, 9; Manchester, Leeds, and Newcastle-on-Tyne 5 each; and West Ham, 4; while Glasgow and Dublin reported 10 and 6 respectively.

The number of stillbirths registered during the week was 263 in the great towns (corresponding to a rate of 89 per 1000 births), including 60 in London.

INFECTIOUS DISEASE IN NORTHERN IRELAND.—According to a return just issued by the General Register Office in Belfast (H.M. Stationery Office, 1s.) the following cases of infectious disease were notified to the Ministry of Home Affairs during the second quarter of 1928—namely:—Enteric fever, 99 (70); typhus, 4 (4); small-pox, 0 (0); scarlet fever, 782 (458); diphtheria, 254 (123); pneumonia, 50 (2); cerebro-spinal meningitis, 3 (3); encephalitis lethargica, 1 (1); erysipelas, 41 (19); tuberculosis, 280 (262); measles, 3 (0); chicken-pox, 70 (0); puerperal fever, 10 (8); ophthalmia neonatorum, 4 (4); membranous croup, 1 (1). The figures in parentheses are for the County Borough of Belfast. It should be remembered that tuberculosis is not notifiable in many districts, that measles is only notifiable in Bangor, and chicken-pox only in Bangor and a few small districts. The returns for cerebro-spinal meningitis and encephalitis lethargica are also incomplete.

DONATIONS AND BEQUESTS.—Mr. William Horne Cook, Edinburgh, left nearly £3000 to charities, including £1000 to the Royal Edinburgh Hospital for Sick Children, of which he had acted as treasurer, and £500 each to Muirfield Convalescent Home for Sick Children and the Edinburgh Royal Infirmary.—Mr. Robert Hilder, Threshall Priory, Stansted, Essex, and of the London Stock Exchange, left, besides other bequests, £5000 to St. Mary's Hospital, Paddington, as an endowment for five beds in memory of his late wife's brother, Richard Mynors, formerly chief assistant to Sir William Broadbent at that hospital, and £5000 to the Bishops Stortford Hospital.—Mr. James Walker Oxley, retired banker, of Westwood, Headingley, Leeds, left £5000 4 per cent. Preference Stock of the L.M. & S. Railway each to the Leeds Public Dispensary, the Leeds Tradesmen's Benevolent Institution, and the Leeds District Nursing Fund for the Sick Poor.—Miss Ellen Davis, of Highfield Lodge, Lincoln, left £1000 to the Lincoln County Hospital, Lincoln.—Mrs. Caroline Ashley Smith, of Onslow-gardens, South Kensington, left £500 each to the Ramsgate General Hospital and the Princess Louise Hospital for Children, Kensington, W.—Leaving over £47,000, Dr. Alfred Charles Augustus Packman, of Grove House, Rochester, bequeathed the bulk of his estate in trust for his brothers and sisters, and on the death of the survivor of them between the Royal Medical Benevolent Fund and the West Riding of Yorkshire Medical Charity.—Miss Martha Mills, of Nottingham, left, among other bequests, £1000 to the Nottingham General Hospital, for the endowment of a bed in memory of her brother-in-law, Morris Weisblum; £100 to Dr. Barnardo's Homes; £50 to the Lord Roberts Memorial Workshops, London; £50 to St. Dunstan's Institute for Blinded Soldiers and Sailors; £50 to Ellersley House, Nottingham, Home for Paralysed Soldiers and Sailors; £50 to Lord Mayor Treloar's Homes for Crippled Children; and £100 to the Nottingham General Hospital.

Reviews and Notices of Books.

BRAIN AND MIND,

Or the Nervous System of Man. By R. J. A. BERRY, M.D., F.R.C.S., F.R.S. Edin., Dean of the Faculty of Medicine and Professor of Anatomy in the University of Melbourne, &c. New York: The Macmillan Company. 1928. Pp. 608. 31*s.* 6*d.*

THE appearance of Prof. R. J. A. Berry's interesting and provocative book is doubtless a sign of the times; it proceeds logically from the simple to the complex, from structure to function, from the physiological to the psychical; it insists on psychology as a department of biology, on neuronic insufficiency as the necessary antecedent of mental disease. In his opening sentences Prof. Berry indicates his personal standpoint in the clearest fashion: "it is not uncommon to find the human mind spoken of as though it were something which had no physical basis whatever, but was the result of a Psyche or soul, whereas the truth is that all mental phenomena are strictly dependable on physical construction, and that the elementary basis of such construction is always the neuron or nerve cell." Thus is the gauntlet thrown down in challenging fashion; no neuron, no mind, is the author's battle-cry. The reception of this finely written and closely reasoned thesis by the individual reader's mind will no doubt depend on the latter's preconceptions and mental training; he may welcome it as elaborating in a convincing way what he has felt all along to be the only rational manner of envisaging the facts; or, on the other hand, he may remain coldly unimpressed, satisfied that no amount of objective correlation of cerebral structure with psychical manifestation will explain the essential difference of the two orders of things, psychical and physical.

It is well, none the less, that the materialistic viewpoint (the epithet may be used in this connexion without misunderstanding) should be adequately stated, and that the body of evidence which can be advanced in its support should be properly marshalled and duly evaluated. That a professor of anatomy should do this for us cannot surprise those who are acquainted with Prof. Berry's previous work and research; after all, why should he not? No one whose knowledge of intimate neural structure is as profound as his can fail to see that by itself this marvellous complexity is nothing; its meaning, its purpose, its activity, form the fascination never absent from pure morphology. The only material physical distinction between man and the lower animals is that he possesses about three times as many cerebral neurons as does any other animal; and that his increased mentality is solely due to this cause cannot seriously be called in question. On the pathological side, the conclusion is that all the abnormalities of neural function, whether currently they are held to belong to the domain of psychopathology, psychiatry, or neurology, fall into four groups—absence, diminution, perversion, or exaggeration, respectively, of the functions of the three great structural divisions of the central nervous system—viz., receptor, internuncial, and effector neurons.

Straightforward as is Prof. Berry's exposition of his thesis, and impressive as are his numerous illustrations taken from clinical medicine, we should have been glad to have his views on the possible influence of function on structure; assuming that such a process is not only conceivable but on occasion actual, we should have been interested in his explanation of its bearing on his own line of argument. There must surely be interplay between vitalism and structuralism; in an appreciative preface written by Dr. Foster Kennedy, of New York, he insists that nurture is requisite, as well as nature, if the neuron is to flower; and we may recall the dictum of the veteran Prof. von Monakow, that every psychical process presents certainly a physiological effect in the brain, whether we will or not.

THE CLINICAL EXAMINATION OF THE NERVOUS SYSTEM.

Fourth edition. By G. H. MONRAD-KROHN, M.D., F.R.C.P., Professor of Medicine in the Royal Frederick University, Oslo, &c. With a foreword by T. GRAINGER STEWART, M.D., F.R.C.P., Physician to the National Hospital, Queen-square, &c. London: H. K. Lewis and Co., Ltd. 1928. Pp. 209. 7*s.* 6*d.*

WE have reviewed Prof. Monrad-Krohn's handbook on previous occasions, and compliment its author on the appearance of a fourth edition—a sure sign of appreciation and of its intrinsic merits. Comparatively little change has been made in the latest edition. Two or three pages on the interpretation of X ray photographs of the skull have been added. The book contains much useful and practical information in small compass, and deserves to be still more widely known.

THE PRINCIPLES AND PRACTICE OF OBSTETRICS.

Fifth edition. By JOSEPH B. DELEE, A.M., M.D., Professor of Obstetrics at the Northwestern University Medical School; Obstetrician to the Chicago Lying-in Hospital and Dispensary, and to the Mercy Hospital, &c. London and Philadelphia: W. B. Saunders Company. 1928. Pp. 1140. 55*s.*

THE fourth edition of this well-known text-book of obstetrics was published at the end of 1924, and even in this short space of time extensive alterations have been found necessary in both text and illustrations. The book is very complete and will be of value to those who take more than a superficial interest in this branch of medicine. The views of Dr. DeLee on pregnancy and labour are well known in this country. There are probably few who agree with him that more than half the pregnancies which occur in a civilised state are pathological; in spite of this view, however, he does not advocate excessive interference with the normal course of nature. The scientific side of the subject is dealt with fully, and hundreds of references are given to the various original papers from which quotations are made. In dealing with treatment, the author discusses the measures which have from time to time been advocated, and then describes his own practice. Midwifery under adverse conditions does not receive the amount of attention that might be expected in a book of this size.

In the previous edition Dr. DeLee was full of praise for the transperitoneal cervical Cæsarean operation, and we are interested to note that his further experience confirms his original opinion. The operation has now been performed at the Chicago Lying-in Hospital 620 times with six deaths. In 1924 it had been performed 266 times, so that this one hospital alone apparently has to deal with nearly 100 cases a year which require Cæsarean section. Thirteen excellent illustrations show the various stages of the operation. Catgut only is used for the uterine sutures. In both the classical and the low operation no attempt seems to be made to produce a thick scar in the uterus; it would be interesting to know how often the scar stretches. In the chapter on placenta prævia no mention is made of Willett's scalp forceps now used with great success in this country. It is not easy to discover the author's views on the treatment of eclampsia. He seems to approve of both the operative and the conservative methods under different conditions. If the conservative method is chosen, he advises that labour be terminated as soon as possible—i.e., as soon as the cervix is fully dilated. "If the head is engaged, forceps; if not, version is chosen." He approves of venesection, but considers eliminative measures to be useless. Chloroform should

never be used to produce anæsthesia, and in his opinion ethylene is to be preferred to ether. He mentions that veratrone was recommended for the treatment of eclampsia in 1859, and places this form of treatment in the same category as amputation of the breasts. The chapter on forceps is most informative. In it the evolution of the modern instruments is discussed in detail. Dr. DeLee is not as enthusiastic as are most continental writers about the value of the Kjelland forceps.

This book has established itself as one of the leading works on obstetrics in the world. It is too large for the junior student, but for those engaged in the teaching of midwifery, and for those reading for higher examinations, it is invaluable. We would have preferred the weight to be less than five and a quarter pounds, but the illustrations and printing are beyond criticism.

A SHORT HISTORY OF MEDICINE.

Introducing Medical Principles to Students and Non-medical Readers. By CHARLES SINGER, M.D., D.Litt., F.R.C.P. Oxford: The Clarendon Press: London: Humphrey Milford, Oxford University Press. 1928. Pp. 368. 7*s.* 6*d.*

Dr. Singer has here attempted to trace the process by which medicine had its source in a number of isolated sciences, united into one stream in the eighteenth century with the rise of the scientific method of inductive reasoning, and divided in our own age into an ever-widening delta of ever-multiplying specialties. His aim is, by treating of medical ideas rather than of medical men, principles rather than details of practice, to indicate the Entelechy—or soul—underlying the bewildering network of modern medical science. He fears lest facts be piled up too fast for the philosophers to rationalise them, and pleads for the understanding of medicine as a whole and of its purpose in human affairs. The story of the infancy of medicine is kept within very strict bounds, and more than half the book is devoted to its modern developments, the beginnings of which Dr. Singer sees at about the year 1825, which he takes as the start of his Period of Scientific Subdivision. He traces in detail the development of the ideas which are now expressed in forms so much a commonplace of medical life that the realisation of their comparatively recent origin comes as a surprise. He shows, for instance, how the experimental foundations of modern medicine were laid by the work of the great physiologists Johannes Müller, Claude Bernard, and Karl Ludwig less than a hundred years ago. The cell theory and the study of cellular pathology did not exist before the work of Bichat at about the time of the French Revolution, and other keystones of medical science such as the germ theory, anæsthesia, and immunity are, of course, still more modern. The conquest of the tropics, the growing enlightenment in the field of psychology, the revolution in nursing, and the latest advances in pharmacology bring the absorbing story down to the present day.

The book is compact and well balanced, and is replete with charts and the interesting and recondite illustrations upon which the author is an authority. The Oxford fount and the rich paper make the volume a delight to the touch and eye. No one requiring a summary of the position of medical science, and its place in modern life, could wish for a more lucid author or a more favourable vehicle.

AIDS TO ORGANIC CHEMISTRY.

By STANLEY F. SMITH. London: Baillière, Tindall and Cox. 1928. Pp. 114. 3*s.*

Mr. Smith has taken the course of organic chemistry at St. Thomas's Hospital Medical School as the basis of a little book intended to help medical and science students in reviewing a subject which they often find to be elusive. Prof. R. H. A. Plimmer, whose course has thus been annotated, points out in a prefatory note where Mr. Smith has been able to bridge the gaps inevitably left in the subject owing to the short time allotted to it. The notes and formulæ are well arranged and indexed, and the book should prove useful for its modest purpose.

OPERATIVE SURGERY.

Third edition. By J. SHELTON HORSLEY, M.D., F.A.C.S., Surgeon, St. Elizabeth's Hospital, Richmond, Va. London: Henry Kimpton. 1928. Pp. 893. 63*s.*

THIS book has a recognised place in contemporary surgical literature. It is built up on the usual lines, but certain subjects receive more prominence than is customary. Much space is devoted to plastic work, and the account of this branch of surgery is very good. The surgery of the vascular system is also considered fully, and is a subject upon which the author is well qualified to speak with authority. His own methods of pyloroplasty and of performing the Billroth I. operation are described, and his reasons for recommending them. We notice a certain unevenness, not in the presentation of the subject matter, but in the perception of the true value of different surgical procedures. For instance, quite detailed and illustrated accounts are given of Trendelenburg's operation for removal of a pulmonary embolus, after which no patient has survived more than a few days, and of Coffey's operation for excision of the head of the pancreas which has not yet been performed in man; on the other hand, the details of much more ordinary procedures, such as the removal of cervical ribs or hypophysectomy, are too briefly dismissed. On the whole, however, a high standard is maintained, and the book should retain its popularity.

DENTAL MEDICINE.

By F. W. BRODERICK, M.R.C.S., L.R.C.P., L.D.S. Eng., Hon. Dental Surgeon to the National Sanatorium for Diseases of the Chest, Bournemouth. London: Wm. Heinemann (Medical Books) Ltd. 1928. Pp. 364. 21*s.*

THE author of this book writes with deep sincerity and has assembled an enormous amount of material in support of his thesis, which is, very briefly, that the predominant underlying cause of dental caries is acidosis, whilst pyorrhœa alveolaris is the result of an attempt to compensate alkalosis. In support of this belief the book contains chapters dealing in considerable detail with such branches of physiology as the regulation of the hydrogen-ion concentration of the blood, the glands of internal secretion, calcium metabolism, and the chemistry and physics of the saliva. It is clear that Mr. Broderick's study of the literature on these subjects has been extensive, but it would appear that this study was not undertaken with an unbiased mind, for his numerous quotations are almost invariably selected with a view to supporting hypotheses which, in the opinion of many distinguished physiologists, are at present quite unproven. It would be unfair to so sincere and industrious a writer to dismiss his theories in silence, but it would be equally unfair to suggest that his book as it stands is a fitting one to be read and accepted by the uninstructed reader, especially if such a reader has had no more thorough medical education than is received by the average dental surgeon. For it may be said that nearly all Mr. Broderick's main conclusions could, by an equally careful selection from the published work of various reputable observers, be disproved or shown to be without a sound basis of fact. Any author is, of course, free to express his theories in writing, but to publish a book entitled "Dental Medicine" is a challenge to criticism, in that the perusers of such a book may expect from its title to find in it a reasoned exposition of the established facts concerned in the subject. We have been unable to find any important series of observations in this volume made by the author himself in support of his beliefs, and it seems fair to suggest that he would

have done far more on behalf of the theories which he sponsors if he had produced a reasonable series of some hundreds of observations on his own patients, carried out with unimpeachable biochemical technique, with a view to producing actual data to support his conviction that the acid-base equilibrium of the blood is disturbed in a specific manner in each of the two great dental diseases.

FOLKLORE OF THE TEETH.

By LEO KANNER, M.D., Yankton State Hospital, South Dakota. New York: The Macmillan Company. 1928. Pp. 316. 17*s*.

THIS book appeals to a wider circle than the professional reader, doctor, or dentist; it contains a surprising amount of information, bears evidence of reading and research, and is instructive as well as interesting. The contents are arranged in the following sections: number, shape, and eruption; popular dental hygiene; toothache and its cure; artificial deformation of the teeth; teeth as used outside the oral cavity. An appendix contains a bibliography and a glossary. Shakespeare would seem to have been one of the first to put in print the information, which must have been, even in his day, as old as the hills, that not even a philosopher can endure toothache patiently, while Burns cursed his affliction in robust Scottish verse. The chapter on plant treatment of toothache is dull reading, but it could not have been omitted from a work of this kind, and the rest of the book contains on almost every page interesting items of dental folklore. The golden tooth of the Silesian boy seems to have deceived nearly everyone save a canny Scot!

Details are given of the martyrdom of St. Apollonia, whose executioners, to punish the boldness of her confession, beat out her teeth and who thereafter became the patron saint of toothache; there is a frontispiece of the saint, reproduced from the painting by Dolci, at Rome. We do not observe any direct mention of soot as a popular tooth-powder. Harold Bluetooth is mentioned; one supposes him to have been the possessor of a dead incisor; but we miss Jenny Greenteeth. It may be that the latter is pure nursemaid fiction; but such was the name of the presiding genius of a certain pool in front of a rectory house on the Welsh border 60 years ago. When the children were allowed to fish in the said pool, with a "wurrm," they were always cautioned to beware of Jenny Greenteeth. In our day the myth was somewhat exploded, for an uncle, on one of these fishing excursions, had caught Jenny Greenteeth, who turned out to be a large eel. It is possible that, to the rustic mind, she may have represented the ghostly spirit of a previous rector, who chose the pool in front of his own door as the readiest mode of committing suicide. We cannot tell.

BIONOMICS.

Animal Ecology. By C. ELTON. London: Sidgewick and Jackson. Pp. 207. 10*s*. 6*d*.

ŒCOLOGY (for there is no reason for adopting the Americanised form of what was originally a German word) is the study of the relationships of animals and plants to one another and to their inorganic surroundings. Hitherto it has been mostly studied by botanists; this is indeed the first book on animal œcology to be published in this country and one of less than half a dozen written in English. The subject is one of much interest for its own sake, and its medical and hygienic implications are considerable. The control of many parasitic diseases depends on a knowledge of the habits, life-histories, food, and enemies of the lower animals which intervene in the cycles of infection; an œcological knowledge of rats, mosquitoes, and tsetse-flies is as important as full systematic information. Mr. Elton has himself made some important contributions (*Jour. Hyg.*, 1925, xxiv., 138) to the study of the periodic waves of excessive abundance which come over animals like lemmings, hares, and voles and end generally in epidemics, and has, in this book, provided an interesting and stimulating introduction to the whole subject.

JOURNALS.

AMERICAN REVIEW OF TUBERCULOSIS. April–June, 1928.—Dr. Henry D. Chadwick discusses the X ray and clinical diagnosis of pulmonary tuberculosis in children. He draws attention to the confusion that arises when juvenile and adult types of pulmonary tuberculosis are not separated into two distinct groups. The diagnosis of the juvenile type depends on a consideration of factors, the most important of which are radiographic evidence of calcified hilar glands and nodules in the lungs, the intradermal tuberculin test, and a history of exposure to infection. Physical signs are of less importance. None can be considered pathognomonic though interscapular dullness is due in some cases to muscular spasm, the reflex effect of inflamed mediastinal lymph glands. Auscultation and percussion are chiefly of value in so far as they determine the presence or absence of other disease. Calcified glands and nodules are definite evidence of tuberculous infection. In the absence of evidence of calcification enlarged or dense hilar shadows may be due to early infection, in which case skin tests and a study of symptoms may supply further evidence of disease and indicate the need for careful supervision and treatment.—A statistical study of the results of artificial pneumothorax treatment at the Locomis Sanatorium during a period of 14 years is supplied by Dr. Andrew Peters. In a series of 273 patients no cases of gas embolism or pleural shock were encountered. Of all patients in whom any pneumothorax at all was induced, 42 per cent. were living at the end of 2 to 14 years, and 24 per cent. were reported in satisfactory condition. The end-results in the pneumothorax group were nearly twice as good as those obtained when no pneumothorax was possible. When a satisfactory collapse of the lung was secured tubercle bacilli disappeared from the sputum in 72 per cent. of the cases and over 60 per cent. were alive at the end of the period quoted.—Dr. F. M. Pottenger contributes a paper on factors fundamental to healing in tuberculosis. Primary infection is met by a non-specific response by the body cells. A reaction which is "largely non-inflammatory" results in the formation of tubercles at the points of attack. When allergy has been established as the result of the absorption of tuberculous products at the source of infection the reaction of the body cells towards bacilli and bacillary protein changes. If reinfection occurs inflammation and exudation dominate the process. The response is now specific. Primary infection is an acute disease; a secondary infection, even when the result is fatal, is marked by a chronic course. The pneumonic exudation which accompanies the spread of tuberculosis in lungs is the result of an allergic reaction. Such exudate may completely resolve and leave no scar. This is the explanation of the remarkable clearing occasionally noted in a series of comparable skiagrams of a patient's chest during the course of a disease whose early spread was shown by extensive areas of mottled shadows in the lung fields. Dr. Pottenger illustrates this by a series of plates which demonstrate very clearly how exudation may be absorbed and cavities close as the result of natural healing. This article might well be read as an introduction to that on Tissue Reaction in Tuberculosis by Dr. R. S. Cunningham, and the analysis of Modern Concepts in the Pathology of Tuberculosis contributed by Dr. Max Pinner.

Dr. Charles Terry's book on "The Opium Problem," which was reviewed in THE LANCET last week, can be obtained in England through Messrs. Baillière, Tindall and Cox, 8, Henrietta-street, London, W.C.2.

THE LANCET.

LONDON: SATURDAY, SEPTEMBER 22, 1928.

THE IMPROVISED KNEE-JOINT.

THE operation of arthroplasty of the knee, or the replacement of a joint that has been lost through disease or surgical operation, has taken a long time to make progress in the favour of surgeons. More than a quarter of a century has passed since MURPHY, of Chicago, whom Sir BERKELEY MOYNIHAN has described as one of the supremely great men in medicine through all generations, succeeded in making useful new joints in the place of pre-existing bony ankyloses. Other surgeons have been slow in following up his methods, until PUTTI, of Bologna, reopened the subject soon after the war, and showed a number of remarkably successful results from this operation. Even now only a small number of surgeons seem to be adopting the technique, among them being Prof. HEY GROVES, Dr. W. R. MACAUSLAND, and in the last few years Dr. F. H. ALBEE.

The reasons for a cautious advance are not far to seek. Interference with the joints of the upper limb when properly performed often give excellent results, but the conditions are very different in the lower limb, which has to bear the weight of the body besides taking a large part in its propulsion. The knee is the joint which owes its stability least to the shape of the ends of the bones which enter into it and most to the surrounding muscles, the ligamentous and cartilaginous apparatus. Hence it is obvious that the mere re-forming of bone-ends is not likely to produce a useful joint, while to attempt to make new ligaments such as normally exist inside as well as around the site of the articulation would be a hopeless task. Long atrophied muscles, moreover, do not seem to offer good hopes for a secure control of the joint. Add to this the fact that the newly made knee-joint must bear the whole body-weight at least, and often much more than that, and it is not surprising that some of the most enterprising and skilful surgeons have shrunk from attempting the operation. Besides anatomical and mechanical objections, there are others of a functional nature. The patient who has a firm bony or even fibrous ankylosis in a good position is already in the possession of an exceedingly useful, strong, and painless limb. It is true that he finds it awkward in public conveyances, supposing that he is so fortunate as to secure a seat, and in the balconies of theatres. He is handicapped in the pursuit of the more athletic sports, and riding on horseback is practically forbidden to him. When such a patient is warned that the operation is a severe one, not without danger to limb and even to life, and that the after-treatment is long, likely to be painful, and sure to call severely upon his powers of perseverance and endurance, also that complete restoration of function cannot be guaranteed, he may well decide to leave things as they are. Moreover, the workman whose trade may require him to flex his knee-joint to its full normal extent has little to hope for from arthroplasty, since even passive flexion beyond a right angle is rarely possible after the operation.

There are, however, exceptional cases in which the hope of regaining a useful knee-joint outweighs other considerations. Such, for instance, was a cavalry officer whose future career depended on his being able to ride; he formed one of Prof. PUTTI'S most brilliant successes. Surgeons who desire to be in a position to help such cases should study a recent article by ALBEE.[1] He supplies valuable statistical information of results of operations by various surgeons and describes a modification of technique which has given good results in his hands. This modification is ingenious, resulting from his observation of certain defects in the remote results of some of MURPHY'S cases. Supposing that the wound has run an aseptic course—and no surgeon whose technique is not reliable in this respect should dream of attempting arthroplasty—the chief causes of functional failure are (1) deficient range of flexion and extension, and (2) too great lateral laxity allowing deviation of the leg into genu valgum or genu varum. With the view of preventing lateral instability, which he thinks is a more common cause of failure than lack of flexion, ALBEE substitutes a wedge-shaped for a rounded articular surface of the femur, making a closely corresponding surface on the head of the tibia. Mechanically this is a sound theory, for, as ALBEE says, "weight-bearing forces the apex of the wedge-shaped end of the femur so firmly into the tibia that the danger of lateral instability is practically eliminated." There is no reason to doubt that this is true also in practice, but the conditions which ALBEE postulates as necessary for the lateral security of the joint seem likely to hinder flexion. He insists that each of the two faces of the wedge, which are to lie at an angle of 120° with each other, should be plane, a form which is not likely to allow much angular antero-posterior movement, unless there is great laxity of soft parts. This difficulty does not arise when the rounded shape of the bone ends is adopted. It must be admitted that the photographs reproduced give no indication that his technique has led to restriction of antero-posterior movements of a degree to prevent a useful amount of flexion. All operators are agreed that bony ankylosis of the knee is more suitable for arthroplasty than fibrous. The difference is probably due largely to the fact that among cases of fibrous ankylosis are included all cases of healed tubercle. Yet there seems no theoretical reason why a tuberculous knee in which the disease has long ceased to exist should not afford as good a result as one with osseous ankylosis due to an acute non-tuberculous infection. Even with modern means of examination such as X rays, however, it may not be possible to determine beforehand whether the inflammatory process is completely organised or only quiescent. But when a knee-joint has been successfully excised for tubercle it is probable that all diseased tissue has been removed, and the subject of such an operation might be given a new joint if he finds his disability distressing, without fear of stirring up a latent infection. ALBEE reports a most satisfactory result of arthroplasty in a knee formerly tuberculous. He adds a useful hint as to the choice of cases. Patients who are neurotic, unstable, and timorous are not likely to be such good subjects for arthroplasty as the bold and calmly hopeful who have shown pluck under previous sufferings and perseverance in making the best of their disabilities. Convalescence is a tedious affair, and the final result depends largely on the prolonged coöperation of the patient.

[1] Original Features in Arthroplasty of the Knee with Improved Prognosis. By Fred. H. Albee, M.D., F.A.C.S., Surgery, Gynecology, and Obstetrics, September, 1928, p. 312.

THE NATURE OF THE ROUS TUMOUR.

THE relationship of the filterable tumours of the fowl to mammalian neoplasms is one of the burning questions of cancer research at the present time. Until recently many pathologists were inclined to consider these fowl tumours as a disease sui generis, while some authorities even classified them as infective granulomata. Any observation which tends to establish an essential similarity or dissimilarity between these tumours and mammalian neoplasms is therefore of importance. Two years ago Prof. S. RUSS and Mr. G. M. SCOTT published in our columns [1] the observation that the Rous tumour when irradiated in vitro was extremely resistant to the destructive action of X rays as compared with mammalian tumours. The same resistance was exhibited by a cell-free filtrate of the Rous tumour, which contains the causative agent of this growth. If the causative agent is resistant to irradiation one would naturally expect that the Rous tumour when irradiated in vivo would also prove to be very resistant. Indeed RUSS and SCOTT recorded observations which proved that this was the case. Soon after the publication of their results Dr. J. C. MOTTRAM [2] set out the results of experiments which showed that under suitable conditions the Rous tumour when irradiated in vivo could be made to regress as readily as some of the transplantable tumours of the mouse and the rat. This result was unexpected and indeed paradoxical. The causative agent is present in the tumour, and as the experiments in vitro show, is very resistant to irradiation. Nevertheless the tumour regresses. The fowl in which a tumour has undergone regression shows the same phenomenon of resistance to a second transplantation that is observed in mice and rats under similar conditions. In a recent paper [3] Dr. MOTTRAM has recorded the results of experiments which show how this remarkable result can be accounted for. The outcome of his first series of experiments seemed to deepen the mystery. He irradiated tumours growing in fowls with doses of radium known, from previous experiments, to be sufficient to cause ultimate regression of these tumours. Before regression was complete the tumours were removed and dried in vacuo. When this dried material, which did not contain living cells, was inoculated into fresh fowls new tumours were formed. The same result was obtained with a filtered watery extract of regressing tumours. It is clear, therefore, that a tumour regressing under the influence of irradiation still contains the causative agent or virus in an active form. Why, then, does an irradiated tumour not infect the surrounding tissues and grow by extension, instead of regressing as it actually does?

The answer to this question was found by irradiating areas of the skin and then, after scarifying the skin, applying to it active filtrates of the Rous tumour. Such filtrates, though producing tumours in non-irradiated areas of scarified skin, were unable to do so in the irradiated skin. Histological examination of these skin areas showed that the fibroblasts which are abundantly present in a scarified area of non-irradiated skin are absent in previously irradiated skin. Now MCINTOSH and BAKER have shown very conclusively that the Rous tumour arises from a transformation of the normal fibroblasts, and Dr. MOTTRAM'S observations confirm their conclusion. The apparently paradoxical behaviour of the Rous tumour towards irradiation explains itself therefore as a manifestation of the extraordinary specificity of the causative agent or virus, which can only infect the fibroblasts of the fowl, but no other cell. Irradiation of the Rous tumour in vivo damages not only the tumour cells, but also the normal cells of the host which immediately surround the tumour, so that in the neighbourhood of an irradiated tumour there are no fibroblasts which can be infected by the causative agent of the irradiated tumour. These observations are of interest not merely because they offer an adequate solution of a particularly intricate problem connected with the filterable tumours of the fowl; they also have a bearing on the more important general question of the relationship of these tumours to mammalian neoplasms. The demonstration of a specific causative agent separable from the living cell in the former group seems to justify the standpoint that these tumours form a disease sui generis entirely distinct from true neoplasms and, as already stated, until recently this was the attitude generally adopted by cancerologists. The work of GYE, although criticised in its experimental aspects, has nevertheless been instrumental in changing this attitude, and there are to-day few workers in cancer who are prepared to deny outright the true malignant nature of these tumours. The essential similarity between the reaction of the Rous tumour to irradiation and that of true mammalian new growths is evidence in support of the view of the fundamental similarity of these two types of neoplasms, and it is the more convincing as it was unexpected on a priori grounds.

[1] THE LANCET, 1926, ii., 374.
[2] Ibid, p. 1266.
[3] Brit. Jour. Exp. Path., 1928, ix., 147.

DEFECTIVE OBSTETRICS.

New Zealand is justly proud of its low infantile mortality-rate; in 1900 this was 75·2 per 1000 births, last year it was 38·7—a world record. The maternal mortality-rate, on the other hand, was 4·91 per 1000 live births, compared with 3·90, the last five-yearly average for England and Wales—an increase of 0·66 on the figure for the previous year.[1] At the same time the rate for puerperal septicæmia rose from 1·37 in 1926 to 2·51 in 1927. This rate, on the graph prepared by the Government statistician, shows a peak about every ten years, and last year's figure was the highest since 1885. The death-rate from other puerperal causes was comparatively low. Prof. Henry Jellett, late Master of the Rotunda, and now consulting obstetrician to the New Zealand Government, considers that the real maternal mortality-rate is even higher than is recorded. He attributes this great loss of maternal life to two main causes: (1) the insufficient education of medical students in obstetrics, (2) the failure to provide sterilised dressings.

The unduly high proportion of cases in which forceps were used in hospital—namely, 12·5 per cent.—is in itself evidence to Dr. Jellett of faulty obstetrical training. The National School of Medicine is at Dunedin University, and in November last Dr. Jellett, in accordance with the instructions of the Minister, met the medical faculty to discuss the best methods of improving the training. To continue in what are substantially the words of his report: the inadequacy of the present methods, which is fully recognised by the faculty, is in no way due to want of effort on the part of the teachers, but rather to want of adequate clinical material and of the necessary funds. When the new regulations for the training of midwives bear fruit, the midwife will be better equipped in the art and practice of midwifery than the medical practitioner. This is a very serious state of affairs, because the midwife is only

[1] Report of the Director-General of Health, New Zealand, for the Year ended March 31st, 1928. Department of Health H 31. Wellington: W. A. G. Skinner. 1928. Pp. 78. 1s. 6d.

trained to conduct normal labour, and if the medical man is insufficiently educated he will be unable to deal with emergencies, and when confronted with them will fall back on radical surgical procedures instead of the milder obstetrical methods which would serve better. If the medical practitioner's education is insufficient, it is probably better that he should not attend confinements at all. The Plunket Society for infant welfare, which cares for the mother in pregnancy and the infant during its first year of life, has made admirable progress assisted by the support of the Government and the general public. The obstetrical department of the medical school, however, the work of which is equally important, is left in the same financial position as it occupied many years ago. It has no professor at its head, no suitable hospital in which to educate its students, and insufficient funds to pay its teachers. The public are probably unaware of the close connexion between the poverty of this department and the high maternal mortality-rate. Provision of the needed funds is presumably a matter for the Government, and one which in the present financial position of the Dominion they may find very difficult. There must, however (says Dr. Jellett), be many wealthy individuals or corporations who would be willing and able to help if the need were brought home to them, but this has, so far, not been done. The faculties of medicine and surgery have each £1600 a year, mostly from private benefactions, with which to pay their staffs; the faculty of obstetrics has a bare £530, and even this is to be reduced at the end of this year by £75. Dr. Jellett suggests that the Department of Health make a public demonstration of the needs of the obstetrical department of the medical school a part of its propaganda for the reduction of maternal mortality.

The second great need, that of asepsis, is treated very fully by Dr. T. L. Paget, inspector of hospitals. He has succeeded after great exertion in making cheap and efficient sterilising equipment available in hospitals, and in minimising the spread of puerperal sepsis in maternity institutions, holding that if the same standard of asepsis were maintained in private practice as under the regulations in hospitals, puerperal sepsis rates for the Dominion would greatly diminish. This depends not only on the education of the medical man, but on the coöperation with him of the patient and nurse. The training of nurses and midwives in asepsis is slowly improving, but much remains to be done, especially in private practice. To quote Dr. Paget: the adoption of asepsis in surgery took 15 years, and the training of the nurses who had not learned it originally was done by surgeons in actual practice. The training of maternity nurses in asepsis can, he says, only be done in a reasonable time, when every medical practitioner feels it his duty to see that it is completely carried out. The patient must be made to recognise its importance, and be advised to choose a nurse who understands it, and to provide a sterilised maternity outfit. The antenatal clinics supply these outfits, yet only 515 of a possible 1900 patients confined in private took the opportunity of obtaining them. Dr. Paget is urging their provision in all centres of maternal welfare; they cost about £1 5*s.* each if made of towelling (convertible after use into babies' napkins), and 10*s.* if made from old sheets. He sees the key to the problem of maternal welfare in coöperation between the expectant mother and her husband, a well-trained antenatal clinic nurse, an alert and efficiently trained medical attendant, and a well-trained maternity nurse or midwife on the one hand, and the services of the hospital board, which can provide hospital accommodation for patients who need it, and services for sterilising outfits for all patients on the other. If the Dominion Government and people attack the problem on these lines under the energetic leadership of obstetricians like Drs. Jellett and Paget, there is no doubt of their success, but a great awakening of public interest is obviously necessary. The recent inauguration by Mr. Victor Bonney of the New Zealand Obstetrical Society marked a definite step forward by the profession; the entire frankness of the Director-General's report indicates that the Dominion Government is willing to play its part. The education of the general public lies with the Minister of Health and the lay press.

Annotations.

"Ne quid nimis."

INTERNATIONAL VISIT TO BRITISH SPAS.

MEDICAL hydrology has had its meetings at continental health resorts whether in France, Italy, or Czecho-Slovakia, but until now no international medical party has visited British spas. This is to be put right when the International Society of Medical Hydrology holds its annual meeting from the 9th–17th of next month. The rendezvous will be London, where a reception will take place at the house of the Royal Society of Medicine on Tuesday night, Oct. 9th, and conferences have been arranged for the two following days, under the presidency of Lord Dawson. The first of these discussions, to be introduced by Dr. C. W. Buckley (Buxton), will deal with the organisation of the spas in various countries, especially for the treatment of insured persons, and the second with the humoral factor in disease, with particular reference to the action of waters. After this the party, numbering over 100 individuals of 17 nationalities, will make a tour of the spas, where they will see at first-hand the whole development of the native waters of Britain. At Harrogate opportunity will be given for considering specially the treatment of children by waters and baths, and at Buxton there will be a conference on rheumatism as a national problem. Visits will also be paid to Droitwich and Bath. Places are still available for a limited number of members of the medical profession who would like to make the tour of spas under such stimulating conditions and to take part in the discussions. A programme of arrangements in three languages is available, and particulars may be obtained from the Hon. Secs. of the Society, 139, Marylebone-road, London, N.W. 1.

LOCAL ANÆSTHESIA IN THE REDUCTION OF FRACTURES.

LOCAL anæsthesia is making rapid advances and is being used more and more for surgical conditions which formerly could be treated only under general anæsthesia. English surgeons are perhaps more conservative in their attitude towards local anæsthesia than their American and Continental contemporaries, and, while this is a tribute to the excellence of our anæsthetists, the use of local anæsthesia might with advantage be extended. A useful application has recently been described in two American medical papers—namely, the reduction of fractures of the forearm after infiltration anæsthesia with novocaine or procaine. The shorter article of the two describes two cases of fracture of the forearm which were reduced at the Boston Dispensary after infiltration with 1 per cent. novocaine solution.[1] In the other article [2] Dr. Carl O. Rice, of the Minneapolis General Hospital, gives a more detailed description of this method of reduction, a method he has used with success in a series of more than 50 cases treated during eight months in the receiving ward of his hospital. In no case did the manipulations cause pain, and the greatest discomfort that was ever noticed was a feeling of pressure or a painless grating during reduction. The reduction itself was always easy, and it was never necessary to use much force owing to the

[1] New Engl. Jour. of Med., 1928, excix., 66.
[2] Jour. A.M.A., 1928, xc., 1768.

perfect muscular relaxation. The only two failures reported were in cases in which the deformity recurred and further infiltration was tried on the next day. The use of a second infiltration is now considered unwise, and general anæsthesia is recommended for the second attempt. Dr. Rice uses a 1 per cent. solution of procaine hydrochloride and the method he employs for the induction of anæsthesia has the merit of great simplicity as no very accurate visualisation of the important structures round the wrist-joint is necessary. After sterilisation of the field of operation with alcohol and iodine two subcutaneous wheals are raised about one inch above the line of fracture in the radius, one opposite to the dorsal border and the other opposite to the lateral border. A needle 2½ in. long is now inserted through the wheal opposite the dorsal border, and the dorsal and lateral surfaces of the radius are infiltrated in turn without withdrawing the needle. The ventral surface is infiltrated from the second wheal, the radial artery and the median nerve being avoided by keeping the needle close to the bone, so that it passes posterior to these structures. If no blood appears in the syringe during the injection the needle must be pushed in the direction of the fracture until blood appears and then about 5 c.cm. of the anæsthetic solution are injected into the effused blood at the site of the fracture. The total amount of anæsthetic used is 15 to 60 c.cm., and manipulations may be started about half an hour after the injection. Obviously this method cannot be used in the presence of infection or in compound fractures, and the risk of infection in uncomplicated cases must be considered. The author, however, considers this to be negligible when reasonable precautions are taken, and no case of accidental infection has occurred in his experience. The fact that the anæsthesia lasts for some time makes it possible to have a radiological examination after reduction; and if necessary further manipulation may be undertaken at once to improve the position of the fragments. It may be stated, therefore, that this method is one to be considered carefully, as it has many applications, even if it is not adopted as a routine in cases in which nitrous oxide anæsthesia would be adequate. The problem of a fracture of the lower forearm, with slight deformity, in the aged, the plethoric, and the alcoholic need no longer exist to worry the busy out-patient surgeon.

THE CHEMICAL COMPOSITION OF DENTAL ENAMEL.

PROBABLY the technical difficulties attendant on both the chemical and microscopical examination of the enamel of teeth have served to stimulate investigation of a tissue which forms so small a part of the body. But the interest has not been purely academic, for as the external calcified covering of the teeth, enamel represents the first line of defence against caries; when it is destroyed the tooth is left almost, though not entirely, unprotected against destruction. Much of the work on enamel has been histological, but various chemical analyses of this tissue have been made. In this country Sir Charles Tomes's findings in 1896 were that though a trace of organic matter might be present it was not enough to amount to a weighable quantity. Lovatt Evans in 1913 published an analysis and concluded that enamel contained at least from 1 to 2 per cent. of organic matter. Since then no further chemical analyses have been recorded in this country until E. Sprawson and F. W. Bury communicated a paper recently published in the Proceedings[1] of the Royal Society. The specimens of enamel examined were obtained by filing with a metal file. To remove any contamination from the file each specimen was exposed to a powerful electro-magnet such as is used in ophthalmic surgery. The nitrogen content was estimated by Kjeldahl's method, but the ammonia content was determined colorimetrically by means of Nessler's solution. The carbon content was estimated by means of a special apparatus devised by Dr. W. H. Patterson. As a result of a series of 20 analyses Sprawson and Bury find that the maximum organic content of enamel calculated from the highest nitrogen content is 0·15 per cent. The amount of protein calculated from the carbon present is a little higher. Samples of enamel from young persons, from adults, and from the deciduous teeth showed practically no difference in the organic content. Sprawson and Bury appear to have taken careful precautions to avoid fallacies which might vitiate the analyses and to have used very delicate methods. Their results, if they are confirmed, will have a definite bearing on some of the hypotheses of the causes of dental caries and its prevention which are being widely and increasingly championed in many quarters. During the last decade as a result of the microscopical study of enamel there has been an increasing tendency to believe that enamel, far from being practically an inorganic tissue, contains a definite amount of protein and that it is thus a vital tissue, capable of reacting to injury like other tissues so long as the dental pulp remains vital. The evidence for this hypothesis is of a cumulative character and drawn from a variety of observations. Enamel can be stained not only by the treatment of sections, but also by diffusion through the dentine in whole teeth. This would suggest that calcification is incomplete and by inference that the stained areas contain protoplasm. H. Malleson, by means of a delicate technique, was able to decalcify enamel and to demonstrate that the residue showed a definite structure. By analogy with other calcified tissues this would suggest that it contains a distinct organic basis, sufficient to show the character of its structure after decalcification. Although there is a definite line of demarcation between the dentine and enamel, yet the dentinal tubules may extend a short way into the enamel. The late Howard Mummery demonstrated the presence of what he termed fibrous bundles extending from the dentine into the enamel. A. Livingstone attempted to widen this conception and described certain experiments which gave some support to the suggestion that the enamel might act as an osmotic membrane. An observation of much interest was made by Mummery when he described the occurrence of translucency in enamel in cases of early caries of enamel. These closely resembled the translucent zones seen in dentine in the early stages of caries, which zones are known to be caused by the reaction of the pulp producing hypercalcification of the contents of the dentinal tubules. Mummery suggested that the translucent zones in enamel might be caused in the same way—a view which postulates the vitality of enamel. Each or any of these various observations made from different angles might be susceptible of some other interpretation, but their cumulative effect certainly suggests that enamel is not an inert tissue incapable of any change after formation except that of destruction by caries or abrasion. The high degree of immunity to caries in some individuals and the equally high susceptibility in others and also the alternations of susceptibility and immunity often found in the same person at different times might reasonably be explained by changes occurring in enamel after the eruption of the teeth. From this it was an easy step to suppose that it might be possible to influence the resistance of the enamel in various ways, as implied by M. Mellanby in her later work. But whatever inferences might reasonably be based on staining appearances in enamel as to the presence of organic matter, such inferences should be capable of confirmation by chemical analysis and without such confirmation they are deprived of much of their force. In a recent book reviewed on another page Mr. F. W. Broderick refers to Tomes's dictum, that enamel is an inert tissue, as a damper (on the development of the doctrine of the vitality of enamel) which was removed by the work of Lovatt Evans. He makes no mention of the results of Sprawson and Bury. The importance of the discrepancy in results in the view of some dentists is that while the percentage of organic matter found by Lovatt Evans might be sufficient to allow of

[1] On the Chemical Evidences of the Organic Content of Human Enamel. Proc. Roy. Soc., B., vol., cii. 1928.

metabolic changes in the enamel, the percentage found by Sprawson and Bury, confirming Tomes, is considered to be almost negligible. But the discrepancy is not really so very great, and probably none of the experiments here described shows whether the enamel is alive or not. That depends on its reactions to conditions rather than on its chemical composition. And in any case it is probably only a small part of it which *can* be alive. Pending further work no decision can be taken as to whether enamel once formed is incapable of change or whether it remains within the pale of nutrition.

SWIMMING BATH WATER.

THE Wheatley Memorial, as we pointed out last week, lays very just stress on the desirability of running water for public bathing. Even the watercress refuses to use a stagnant pool. Nevertheless it must not be forgotten that it is possible to disinfect the water of public swimming baths so as to make it safe for bathing or even safe (if not appetising) for drinking. Dr. G. K. Bowes in the current *Journal* of the Royal Institute of Public Health regards it desirable to adopt as stringent a standard for bathing water as for drinking water. To do so, however, requires a disinfecting agent continuously present in the water, the simplest and cheapest being free chlorine in the proportion of 0·2 to 0·5 parts per million. Dr. Bowes bases his recommendations on the examination of the water of public baths in Birmingham during two consecutive summers. In America, it appears, use is made of a standard frankly called "the index of stagnation," which consists of the number of bathers divided by the amount of clean water added, measured in thousands of gallons. It will readily be admitted that under a controlled water régime of this kind the incidence of conjunctivitis is likely to be small and any possible risk of the spread of poliomyelitis in this way disappears altogether. The occurrence of suppurative otitis after bathing is on rather a different footing, for this is presumably due simply to the careless admission of water to an infected middle ear whose safety lies in remaining dry. The use of natural running water remains the obvious course for bathers who dislike the accumulation of bacterial and human detritus, and we have little doubt that the memorial to be raised to Dr. James Wheatley will produce a good response.

THE LIMITATIONS OF PLASMOQUINE.

THE Hamburg School of Tropical Medicine, and foremost amongst them Dr. Otto Fischer,[1] have been energetically investigating the action of plasmoquine in human malaria; nor have they neglected the less favourable side of their subject, careful records being kept of the toxic symptoms occasionally caused by the drug's administration. Of these, methæmoglobinæmia is the most alarming, resulting as it does, in cyanosis. Experiments on otherwise normal cats have shown that daily doses of 0·1 to 0·15 g. plasmoquine invariably produce methæmoglobinæmia, but that the intimate mixture of quinine sulphate with plasmoquine seems largely to mitigate this and other toxic phenomena. Thus it has been shown in clinical practice that, if quinine be combined with plasmoquine in a dose of 1·0 g. daily, either no methæmoglobinæmia results or the amount is negligible. Subcutaneous injection of plasmoquine has been attempted at Hamburg, and in doses of 0·02 g. daily was not attended by any ill-effects; but this quantity is too small to have any permanent effects in eradicating the infection, although it may control multiplication of the parasites. On an average the minimal therapeutic dose of plasmoquine is 0·06 g. daily, or 0·01 g. to every 10 kg. of body-weight in benign tertian malaria. In subtertian malaria a total amount of 0·15 g. injected, or a total amount 0·2 g. by the mouth, suffices, whether spread over several days or given more massively within 24–36 hours, to eradicate crescents from the peripheral blood within a period of five days. Failure to banish crescents only occurs when the schizonts are not sufficiently exterminated and can undergo transformation into gametocytes. According to Fischer's observations, plasmoquine-resistant forms of malaria are extremely rare. This is specially true of the benign tertian parasite, in which Fischer has not seen a single failure, but in subtertian malaria three instances have been noted, in which crescents persisted in the blood stream while the patient was taking full doses of plasmoquine. Then it has already been claimed that plasmoquine exerts a selective effect upon the crescents, and his statement appears somewhat paradoxical, but the anomalous effect can be explained by failure of the drug to cause rapid death of the younger schizonts in the earlier stage of the infection. When plasmoquine is combined with quinine there is no such failure, which is a further argument in favour of combining these two drugs and of administering the plasmoquine component in a subminimal therapeutic dose.

[1] Münch. med. Woch., August 10th, p. 1369; and August 17th, p. 1417.

SELF-KNOWLEDGE AND MENTAL HEALTH.

IN a paper read before the British Association Dr. William Brown stressed a point of great importance in the application of the method which he prefers to call "deep analysis" to the cure of psychoneuroses or symptoms referable to faulty adjustment of the mind. That is, the necessity, if a real and lasting cure is to follow, of ensuring not only that the patient shall acquire adequate knowledge of himself, his real needs and his errors, but also that he shall apply that knowledge to setting himself in order, correcting his faulty tendencies and habits, and developing an enlightened self-command. It seems that the more devoted followers of Freud are inclined to neglect this constructive aspect of analysis. Dr. Brown criticises the use of the term "psycho-analysis" for both of two distinct concepts that should have distinct names—first the Freudian method of deep analysis by free association; and, secondly, the Freudian theory of mental function and the manner in which it is modified by this method. This ambiguity is probably not so much a cause of the Freudian tendency to underrate the value of constructive re-education as the expression of an attitude of mind, not confined to the Freudians, that considers the method more than the result. It is a pity that this attitude should exist, but that it does is shown by the divergencies which are so evident between the various schools of psychological thought and impose such a handicap on progress. Dr. Brown therefore uses the term "deep analysis" for the method, reserving "psycho-analysis" for the body of doctrine.

The Freudian system lays what many, including Dr. Brown, consider a disproportionate stress on self-knowledge. Deep analysis is a process by which, in the course of many months and sometimes years of passive re-living of infantile experience and of the "transference" to the analyst of the emotional reactions which have been insufficiently related to the parents and to other persons who have partially replaced them, the patient acquires a knowledge of the primitive layers of his mind. In discussing his experiences with his analyst, who for the time being stands to him for an immensely superior personality, on whom he is extremely dependent and by whom he is highly suggestible, he inevitably adopts, often wholesale, the theory by which the analyst directs his method. Obviously the more rigid this theory is the less will the patient's own personality be able to evolve its own theories and shape the course of its own re-education. And if one thing is held by the leaders of analytical thought to be more important than any other it is that the patient must be led to think for himself, to work out his own salvation. It is for the analyst to provide the material and to

indicate the ways from which the patient shall choose, but ultimately the patient himself must decide which way he shall go and what use he shall make of the material. It is of no use reducing the patient to a state of entire dependence and then turning him loose. After the analysis has been completed and the deepest emotional complexes and their ramifications are laid bare, there comes what many workers consider even a harder task—the education of the patient up to the point where he can free himself of this dependence and become an autonomous being. This is where many analysts, and among them many Freudians, fall short; they do not finish their job, and the patient has either to go elsewhere or remain almost as imperfectly adapted as he was in the beginning.

It is obvious, therefore, that the constructive analyst will exercise great discrimination in the material he provides. It is no good spending weeks in working out infantile phantasies if the resulting knowledge is not going to be usefully employed in the reconstruction by which the patient hopes to adapt himself to the world. The analyst who adheres too closely to a preconceived method will almost inevitably allow his patient to pursue his way through many weary and overgrown by-paths which lead nowhere but into an impenetrable jungle and from which the return may be difficult and painful. The good analyst, like the good artist, knows what to eliminate and where to stop. Dr. Brown speaks of the great resistance which patients sometimes manifest to the process of analysis—"I wish I had not come. I ought not to have come to-day." Some degree of resistance is inseparable from an experience which must at certain crises be extremely unpleasant, but there are almost certainly resistances which arise from the real conviction of the patient's own creative personality that the way ahead of him is one that he would do better to avoid. An experienced man will often oppose his patient's resistances, but he will always respect them; some kinds of broken resistance may mar an analysis as badly as an unnecessarily cut nerve or tendon may mar a surgical operation. It is undoubtedly possible to have too much, even of such a good thing as self-knowledge. Mental analysis has long established itself as an indispensable weapon against the storms and stresses with which life assaults the mind, and the need to-day is, as Dr. Brown says, for analysts with independent and vigorous minds and a determination to think hard for themselves and evolve their own methods and theories. As is the master, so is the pupil, and the more completely an analyst has worked out his own transference on the master of his school and become self-directing, the more completely will he enable his patients to work out their transferences on himself.

X RAYS AND WHITE BLOOD CELLS.

THAT in the treatment of blood conditions repeated divided doses of X rays are more effective than a single massive dose is a principle generally accepted by radiologists, though up to the present it has lacked experimental proof. Such proof is in some measure supplied by the recent work of W. V. Mayneord and A. Piney [1] carried out at the Cancer Hospital. Using a carefully standardised technique, these observers in the course of an investigation into the effect of X rays upon the blood and blood-forming organs, found that a much greater result was produced in rabbits by a dose of approximately 500 R spread over 24 days than by the administration of the same dose at one sitting. As criteria of the effect of radiation upon the blood, these observers used the changes brought about in the three orders of white cells—lymphocytes, neutrophiles, and monocytes. They confirmed the old observation of Heinke [2] that the first and most striking effect of radiation is a progressive diminution in the number of lymphocytes, to be followed by an increase in the neutrophiles and, if the dosage is pushed to extremes, by a rise in the monocytes. At the Cancer Hospital it was found that a persistent increase in the monocytes usually served as an indication of irreparable damage and was followed by the death of the animal. Whether or not the monocyte of the rabbit is to be regarded as the strict homologue of the same cell in the human being remains to be decided; in any case this observation obviously calls for similar investigations in the case of human beings receiving X ray treatment. Typical lymphopenia was found as an early manifestation in the blood of the women affected by the radio-active substances in luminous paint, to whom Sir Thomas Oliver refers (see p. 634); it would be of interest to know if in the cases which proved fatal the monocytes were found to be greater in number than the lymphocytes. Mr. Mayneord and Dr. Piney found in the case of rabbits that death inevitably ensued if the monocytes in the blood came to exceed the lymphocytes in numbers. Working on the spleens of radiated animals Dr. Piney was able to demonstrate a selective action on the part of the rays for the lymphoid tissue of the Malpighian corpuscles, and he suggests that a generalised selective action upon lymphadenoid tissue is the explanation of the lymphopenia induced by radiation. That lymphadenoid tissue is peculiarly susceptible to X rays is shown by a number of clinical observations, notably the susceptibility of the glands in Hodgkin's disease and of the tumour masses in lymphosarcoma to the action of these rays.

[1] British Journal of Radiology, August, 1928.
[2] Mitteil. a. d. Grenzgeb. d. Med. u. Chir., 1905, xiv., 21.

"THERAPEUTIC-MINDEDNESS: A PEDAGOGIC PROBLEM."

UNDER this heading Dr. Paul Reznikoff, of New York, attacks [1] the doctrine that in medical practice treatment is less important than diagnosis. Whilst strenuously opposed to a return to "the enormous number of drugs and methods that preceded the age of therapeutic nihilism," he maintains that present methods of instruction fail to develop a correct mental habit, which he calls therapeutic-mindedness, a desire to heal. On analysing the treatment given in different diseases at a certain hospital, he found much support for his view that therapeutic-mindedness is at a low ebb. In lobar pneumonia, for instance, good or questionable treatment was started in the first eight hours of treatment in only 64 per cent. of cases. Generally speaking, the less dramatic the disease the lower was the percentage of effective treatment. Whereas all the patients in coma at once received good treatment, the percentage of cases in which it was given immediately was only 50 for meningitis, 70 in broncho-pneumonia, and 28 in colitis, and the unfortunate sufferers from sciatica were none of them efficiently treated during their first eight hours. Dr. Reznikoff is well aware that it is largely fatigue that causes the intern who has completed history-taking and physical examination to omit much thought of treatment, and he thinks that the remedy for this faulty attitude is not so much to provide separate courses for the teaching of therapy as to combine the teaching of diagnosis and treatment in such a way that in the mind of a physician failure to alleviate a headache or insomnia shall rankle as much as failure to diagnose an aneurysm. In order, therefore, that the clinical clerk shall give proper attention to his therapeutics, he should attend not only a course in pharmacology and theoretical therapeutics, but also medication conferences and "diet conferences," and—perhaps most important of all—demonstrations of such procedures as colon irrigation, steam inhalation, throat irrigation, hot packs, and bed-making. After each procedure or demonstration the uses of the measure should be discussed, and Dr. Reznikoff finds that

[1] Jour. Amer. Med. Assoc., August 18th, p. 450.

the students become so interested in these conferences that many express their desire to spend some time as orderlies in the wards in order to master the methods.

With such a course of instruction and with the objects that underly it none can fail to sympathise. Many practitioners must wish that they were more in touch with the actual drugs they prescribe and with the methods they order nurses to carry out; it is more than likely, for example, that a large proportion of medical men have neither administered nor observed the administration of the simple soap enema. To correct such defects in experience is obviously desirable, and the attempt is made with more or less success at many of our hospitals. The reader, therefore, may be left wondering whether there is any reason for a cleavage between those who advocate treatment and diagnosis respectively; both wish the patient well, and both are supposed to be making intelligent use of the known facts. But undoubtedly there is some such cleavage. The conservative physician is especially impressed by the fact that all forms of treatment are but mild adjuvants to Nature, and consequently places most highly the need for an estimation of the diagnosis and course of the disease; the enthusiastic "progressive" physician is anxious at all costs to see some improvement or alleviation by whatever methods are available. Both schools are liable to fall into serious error, and whilst agreeing with Dr. Reznikoff in condemning diagnosis without treatment we must admit that treatment without diagnosis is apt to be the more dangerous. And even in Dr. Reznikoff's excellent paper it is possible to detect pitfalls into which the enthusiastic therapeutist may plunge unawares. In the opening paragraph we read that "everyone connected even remotely with the profession agrees that, whatever else the physician may be, he is above all a healer"—a sweeping statement with which many will flatly disagree. And when he goes on to say that "in the matter of therapeutics the future physician must . . . develop an emotional habit" besides a mental habit, he is inserting a line of divorcement between the departments of diagnosis and therapeutics which he has been elsewhere so anxious to weld into a consistent whole.

THE SELF-SUPPORTING HOSPITAL.

WILL the voluntary hospital continue to be voluntary, in the sense most of us at present attach to the word—that is to say, will it remain an institution, supported mainly by voluntary contributions, which gives free treatment to patients—or will it be replaced by the self-supporting hospital? This is the question which Dr. R. J. A. Berry, Professor of Anatomy and Dean of the Medical Faculty in the University of Melbourne, recently put to an audience in that city. Prof. Berry is well-equipped for discussing the subject, since last year he travelled 30,000 miles on a mission of inquiry into hospital and medical problems. The result of his investigations, as detailed in his address, was a strong conviction that the future is to "the medical centre devoted to community health" and its associated self-supporting hospital. He was "profoundly impressed" with this centre, as seen at work in the United States and Canada, and almost as profoundly dissatisfied with the voluntary hospital system of Great Britain which in the main he found, like the hospitals of Melbourne, to be "totally divorced from the pre-clinical and scientific laboratories of a medical school." Prof. Berry laid stress upon the right of the patient, whatever his means, to the benefits of institutional coöperation, coördinated medical knowledge, and individual service, benefits which, so far at all events as Melbourne is concerned, cannot be obtained to the full "in the present isolated hospitals, laboratories, and incomplete medical school" of the city. No one will quarrel with this claim, nor is there any expert at home who fails to recognise that the voluntary hospital is in a state of transition. That our hospitals are all so destitute of immediate association with medical education and laboratory research as he suggests cannot however, so readily be conceded. The connexion between university, medical school, and hospital is by no means unfamiliar, and the advantages of that connexion are so patent that the movement towards the medical centre, where it does not exist, has already begun. Such centres can be planted only in great towns, yet it should always be possible to affiliate to them those smaller local hospitals which often stand seriously in need of the practical experience and scientific help of the great institutions which exist as much for research and prevention as for curative purposes. The isolated individualism of our voluntary hospitals is a drawback which cannot but have an inimical influence upon their usefulness, and it seems inevitable that, sooner or later, we shall have something in the nature of hospital circles radiating from great scientific centres. The self-supporting hospital, which Prof. Berry found so frequently on the North American Continent, is really the voluntary hospital with a difference. It acquires self-respect by being relieved from the necessity of making constant appeals for money, and instils self-respect into those of its patients who are not actually indigent, by teaching them the unworthiness of expecting "something for nothing," an expectation which Prof. Berry has found widespread and resents. He enumerates the sources of revenue of the trans-Atlantic self-supporting hospitals as receipts from endowments which are sometimes considerable, since "no wealthy man dare die in the States without leaving something to his university, home-town, or favourite hospital"; payments for hospital services from middle-class and wealthy patients; payments from local authorities for patients unable to pay for themselves. Thus the occupant of every bed pays, or is paid for. The system is, in effect, a fusion between the voluntary hospital, as we know it (with or without "pay-beds"), and the poor-law infirmary, maintained out of public funds, with this important difference, that nobody is called by the absurd name of pauper. The bill, whether presented to the patient or the authority responsible for him, includes the medical fees which are paid over by the hospital to the medical consultant in charge of the case. If hospitals are to be open, as they already in considerable measure are open, to patients of all classes, that part of the voluntary system which implies the free services of the medical profession goes by the board. The institution of "pay beds" which is becoming so common is a recognition of the changed situation that has been forced upon hospital managers, but it may be found, in the end, to be no more than a palliative.

TRANSMISSION OF DISEASE BY AEROPLANES.

AN Australian correspondent draws our attention to some of the implications of the flight made by Kingsford Smith and his associates from San Francisco to Brisbane. New standards of rapidity in communication must have the effect, he points out, of bringing "the endemic centres of hitherto exotic disease" into dangerous proximity to Australia. Separated by long sea voyages from the primitive sanitation of the East, the Commonwealth has, up to the present, kept fairly free from Oriental infections; thus there has been no case of small-pox since August, 1921, and plague has not occurred since June, 1923. Cholera and yellow fever, indeed, have never penetrated Australia's quarantine barrier, an important factor in this happy state of affairs being the length of time that must elapse on the journey from an infected port. Plague and cholera are prevalent at Rangoon and Bombay, but during the voyage to Australia from these cities any infection is sure to manifest itself on board the vessel, as the incubation period is less than a week. By fast air transport, however, Rangoon is only 62 hours' journey from Australia. Small-pox, moreover, may not develop until 16 days after exposure to infection, within

which time, as Hinkler showed, it is possible to travel the whole way from England. The solution of the problem, our correspondent considers, cannot be quarantine; for who would travel 6000 miles in 84 hours in order to spend the following two or three weeks in a quarantine station? The only possible control, he believes, is by a scheme of quarantine surveillance, whilst vaccination and similar means of mass-immunisation will again have to be utilised to protect a community freshly exposed to risks which it has almost forgotten.

DEATHS UNDER ANÆSTHETICS FOR DENTAL OPERATIONS.

THE percentage of deaths occurring under anæsthesia for dental operations is extremely low, far lower indeed than for general operations; yet fatalities do occur and the number in any year is by no means negligible. The fact that the operation of dental extraction for which the anæsthetic is usually given is of a relatively trivial character, makes the occurrence of death from the anæsthetic employed peculiarly tragic. Our contemporary, the *Dental Surgeon*, has devised a questionaire which it is intended to circulate to those doctors and dentists unfortunate enough to have a fatal case, with a view to eliciting a body of information which may in time become large enough to provide valuable information. As the *Dental Surgeon* truly points out, the reports of such cases are usually of a meagre character and provide little material for forming a judgment as to the best general anæsthetic for dental operations and the conditions favourable or unfavourable to the patient's safety. The idea of such an inquiry is a good one, and we hope that the questionaire will be fully and carefully filled up. It has been so framed as to cover all the essential points, and there can be no doubt that if it should prove possible to collect enough data, knowledge would be gained which might be the means of reducing still further the number of deaths during dental operations.

EFFECTS OF A HIGH CARBOHYDRATE DIET ON LACTATION.

THE claim has frequently been made that starchy foods have a stimulating effect upon lactation, but no systematic study of the influence on breast-milk of supplementary nourishment by one particular starchy food being available, it was decided by three American workers to carry out a thorough investigation of this nature, and their findings were reported in a recent issue of the *American Journal of Obstetrics and Gynecology*.[1] The substances chosen were rice and tapioca, because of their similarity, because both are inexpensive, familiar in the ordinary home, and capable of being prepared in a great variety of ways, and because it has been asserted that tapioca is a galactagogue. A series of 130 lactating mothers in a hospital were divided into three groups, each patient being placed in rotation on her admission and all grossly abnormal cases being eliminated. Group I. received the regular hospital ward diet, and Groups II. and III. this same diet, except that the noon-day dessert was omitted and 60 g. of rice and tapioca respectively were added. A little later a fourth group was started, to whom fat in the form of cream of the same caloric value as the starchy foods was added to the ordinary diet. The hospital dietary had a caloric content of about 2600, the others being brought up to a total of about 3000 calories. The diet was begun 24 hours after delivery, under careful supervision. On the fifth and ninth days, as nearly as possible at the same time, one breast of each patient was completely emptied by electric breast-pump, and the milk analysed, and the babies were weighed for test feeds at the same hour each day.

[1] The Influence of Supplementary Feeding of Carbohydrate upon Lactation. By Israel S. Kleiner, Ph.D., John E. Tritsch, M.D., and Lulu G. Graves, B.E., New York City.

The most important feature of the results seems to be that the quantity of milk obtained by the baby was definitely higher in the two carbohydrate groups, the average intake being 2·40 oz. in the rice group, 2·47 in the tapioca group, 2·01 in the cream group, and 1·84 oz. among those whose mothers were receiving the hospital diet. The differences are comparatively small, but the most rapid growth after the fifth day was found in the rice and cream groups, and all three classes with additional feeding regained their birth-weights during the time in hospital in greater proportion than the control series. The conclusions drawn from the investigation are these: In all four groups the appearance of milk in the mother's breasts occurred about the third day, and in all there was a tendency for the protein to decrease and the sugar and fat to increase from the fifth to the ninth day; on the fifth day the sugar content was lowest in Group I. and highest in Groups III. and IV. (tapioca and cream), and by the ninth day the rice group also had milk containing a high percentage of sugar; the largest quantities of milk, as tested both by the breast-pump and by the weighing of infants before and after feeding, were secreted by the rice and tapioca-fed mothers; the cream diet was the only one resulting in an increased fat content of the milk on the fifth day, but by the ninth day all groups showed about the same percentage of fat. The practical result would seem to be that, by yielding a slightly larger volume and a higher lactose content, the increased carbohydrate diet supplies the baby with a greater fuel value than the ordinary diet.

The Clinical Interpretation of Aids to Diagnosis.

A Series of Special Articles contributed by Invitation.

IV.—THE INTERPRETATION OF REPORTS ON SPUTUM.

BY S. ROODHOUSE GLOYNE, M.D. LEEDS, D.P.H. LOND.,
PATHOLOGIST TO THE CITY OF LONDON HOSPITAL FOR DISEASES OF THE HEART AND LUNGS.

(1) COLLECTION OF MATERIAL: PHYSICAL AND CHEMICAL CHARACTERISTICS.

Obtaining a Specimen.

A PATIENT who has sputum cannot be considered to have a normal respiratory tract, and it may be just as important to examine the sputum as it is to apply a stethoscope to his chest. For practical purposes sputum may be regarded as secretion which comes from the respiratory tract, the ciliated epithelium being assisted in their action by coughing or "clearing the throat." It is not uncommon, however, for saliva and stomach contents to be sent to the laboratory as sputum.

Sputum expectorated in the early morning before food is best for bacteriological examination, and the patient should be asked to rinse out the mouth with sterile water before expectorating the sample. Blood-clot, although complying with the definition of sputum given above, does not as a rule give helpful information on bacteriological examination, except in the relatively rare cases of broncho-pulmonary spirochætosis in which disease hæmoptysis may be a prominent symptom. In cases of early pulmonary tuberculosis with hæmoptysis it often happens that the patient has no sputum except for a few hours, or perhaps a day, following the cessation of the hæmoptysis, when he may expectorate a few drachms. This small quantity of sputum generally contains tubercle bacilli, and the opportunity of sending it to the laboratory should never be missed. Such an opportunity may

not occur again. Only a small quantity—a few drachms—of sputum is necessary for bacteriological examination. A small fresh specimen sent to the laboratory as soon as possible after expectoration is better than a large accumulation of stale sputum collected for a whole day. Autolysis takes place in sputum allowed to stand, during the process of which cells soon degenerate and some pathogenic organisms die out. Tubercle bacilli, however, survive many days after autolysis is complete If a laboratory outfit be not available the ordinary flat-sided bottle commonly used for tablets and throat lozenges makes a suitable substitute. The bottle should, of course, be sterilised before use and in sending by post should be carefully packed and marked "pathological specimen." These directions may seem superfluous, but it is surprising how often they are neglected by the patient.

Children generally do not expectorate readily, and it may be necessary to instruct them how to clear the throat and bring up sputum. This is best done by an adult demonstrating the process for them. Sometimes a small particle of sputum may be picked off the pharyngeal wall by means of a throat swab. When children with pulmonary tuberculosis swallow their sputum the bacilli can frequently be found in the fæces. Probably all patients swallow a certain amount of sputum during sleep. Post-nasal secretion can be obtained also by clearing the throat; failing that tenaceous secretion can be removed from the post-nasal space by means of a swab and the whole sent to the laboratory. When an examination of pus from an accessory sinus is required the "wash out" may be sent for examination, saline being used for the occasion instead of the usual antiseptic.

A full report on a sputum examination would give a description of:—

(1) Physical characters, whether foul smelling, mucoid, mucopurulent, purulent, or blood-stained.

(2) Chemical—the presence of albumin, bile, &c.

(3) The character of the cells, those found in different kinds of sputum being large squamous epithelial cells from the oro- and laryngo-pharynx, epiglottis, and vocal cords, ciliated columnar cells from bronchial epithelium, alveolar cells from lung substance proper, neutrophil leucocytes, eosinophils and lymphocytes. Malignant cells, pigment and fat containing cells are less commonly recorded.

(4) The bacterial flora.

(5) Any unusual substances, such as fibrin, amœbæ, spirochætes, Charcot-Leyden crystals, or Curschmann's spirals.

(6) Virulence tests in suitable animals—the guinea-pig for the tubercle bacillus, the mouse for the pneumococcus and some strains of streptococcus.

A complete examination of this kind is, however, rarely needed, and as a rule the pathologist presents a report only on (1), (3), and (4).

Physical Character.

Mucoid sputum, often greyish in colour from admixture with atmospheric dust, is generally found in post-nasal catarrh, chronic pharyngitis, and bronchitis. The chief characteristics of this kind of sputum are the presence of large squamous and ciliated epithelial cells together with the so-called catarrhal organisms, amongst which the Gram-negative *M. catarrhalis* is usually conspicuous. Pneumococci are generally of the unclassified group IV. type and streptococci of the "salivarius" class. Growth is usually luxuriant and virulence for animals low. Mouth organisms are common.

Mucopurulent sputum of the typical "nummular" type is the common concomitant of pulmonary tuberculosis. The cells are mostly of the pulmonary alveolar type, but the significance of these is rarely emphasised in face of the much more important tubercle bacillus.

Purulent sputum suggests septic bronchitis, broncho-pneumonia, pulmonary abscess, and gangrene, and bronchiectasis. In the last three conditions mentioned it is usually very foul smelling. The bacterial flora is generally very mixed; virulent types of pneumococci and streptococci predominate, but in the fœtid sputum of bronchiectasis and abscess all kinds of unidentified Gram-positive and negative organisms, often anaerobic, crowd the specimen, and mouth spirochætes are common. A report of large numbers of organisms of different kinds in a foul-smelling sputum is very significant of bronchiectasis.

The typical *sputum* of lobar pneumonia is "rusty" looking and sticky, and generally yields the pneumococcus in nearly pure culture. It must be borne in mind, however, that there are many aberrant forms of pneumonia, especially during an influenza epidemic, and these are often characterised by a mixed bacterial flora. In this case, however, the sputum is not typically "rusty" looking.

Blood-stained sputum may be traced to a variety of causes. In pulmonary tuberculosis the finding of the tubercle bacillus, and in broncho-pulmonary spirochætosis the presence of large numbers of spirochætes decide the diagnosis, but there are many cases where the examination of sputum will only yield indirect evidence in support of a diagnosis. In the first place, it is important to ascertain that the blood comes from the respiratory tract. Blood-stained sputum is generally frothy and has an alkaline reaction, blood from the stomach is usually not frothy and is darkened in colour from action of gastric juice, and if mixed with gastric contents the material is likely to be acid. Post-nasal bleeding may be associated with mucus or with muco-pus, or it may consist of pure blood, in which case there will be but very few cells except red blood cells. Post-nasal blood may be swallowed and then vomited. A microscopical examination of the cells in blood-stained sputum may help in showing bronchial epithelium, alveolar cells, pus, squamous pharyngeal cells, and the like. The presence of starch granules or particles of food may also assist in deciding on the source of specimen. In suppurative lung diseases such as bronchiectasis, abscess, and gangrene, blood-stained sputum and hæmoptysis are not uncommon. The great predominance of pus cells, the enormous number of bacteria, of mixed and often unidentified species, and the foul smell, are usually sufficient to clinch the laboratory diagnosis. In mitral disease with failing compensation the capillary oozing into the mucoid secretion often gives a characteristic pink tinge to the sputum. Later, streaks of blood may be present in the mucoid sputum. Infarct produces a much larger amount of blood and of a darker colour, but this is not sufficiently characteristic for diagnosis. Blood-stained sputum may follow operation or the administration of a general anæsthetic, and may be due to trauma, embolus, secondary infection, or the lighting up of quiescent pulmonary tuberculosis. A bacteriological examination for the tubercle bacillus and other organisms is important. Malignant disease of the lung is often described as producing prune juice sputum, but it is neither a helpful nor characteristic description. It should not be forgotten that the malingerer—especially if he has had experience in a sanatorium—can produce a very good imitation of blood-stained sputum from a small abrasion of the gum. Generally it is a more or less homogeneously coloured pink frothy saliva which contains practically no cells but red blood corpuscles. The malingerer will sometimes borrow sputum from another patient, especially if compensation or a pension claim be pending. When suspicion is aroused, the specimen sent for examination should be coughed up in the presence of doctor or nurse.

Chemical Tests.

The presence of *albumin* used to be considered indicative of pulmonary tuberculosis, but it is found in other inflammatory conditions and is not really very helpful as a diagnostic sign. *Bile* is found occasionally when liver substance communicates with lung by ulceration through the diaphragm, but it is more commonly due to the accidental admixture of stomach contents and sputum.

Special Articles.

SPORADIC DYSENTERY IN A LARGE CITY.

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Dysentery is no novelty in Newcastle. It was a frequent visitor in the eighteenth century, when its signs and symptoms were known and adequately recorded. In comparison with the carefully worded and meticulously studied description given by one of the city's physicians, Dr. Andrew Wilson, in his "Essay on the Autumnal Dysentery" in 1760, the accounts of the disease to be found in modern text-books are but colourless epitomes.[1]

One has only to read the graphic descriptions of those days to realise that the old-time clinician had a very definite conception of the cardinal features of the "bloody-flux," and of its existence as a separate entity, altogether different from cholera on the one hand and the simple diarrhœas on the other. From the fact that mention of hepatic signs and sequelæ is lacking, it is obvious that the condition then prevalent was a bacillary and not an amœbic dysentery. Later records are to be found in the Annual Reports of the Newcastle Dispensary,[2] and every year from its opening in 1771 until 1900 a number of cases passed through the books of that institution. In some years the disease was apparently epidemic—for example, in 1783 and 1785 when 329 cases with 17 deaths find record, but more generally the numbers are small. In some of the city's death returns during the nineteenth century dysentery can be separated from its companions—diarrhœa, zymotic enteritis, and intestinal catarrh—and during the ten years, 1874–83, 60 deaths were attributed to it. From 1901 until the war years the record, both of the dispensary books and the death returns is blank.

Under the regulations of 1919 dysentery became a notifiable condition and in that year ten cases, with one death, were so notified. The numbers gradually diminished until in 1924 there were none. In 1925 a group of cases, due to the para-Shiga organism mentioned later in this article, came to notice. These were followed in July of 1926 by a definite outbreak of six cases of so-called "food poisoning," from five of which a Flexner bacillus was isolated.[3]

History of the Present Series of Outbreaks.

In the first week of March of the present year three cases of a mild dysentery due to *Bacillus dysenteriæ* Flexner occurred in two related families, which, though normally residing apart, had been temporarily sharing the same home in Cowgate, one of Newcastle's newer suburbs. Recovery was uneventful in all these cases. During the last week of the same month and the first fortnight of April four sudden deaths in children, aged from 7 to 9, were reported, and each of these was subjected to post-mortem and bacteriological examination. In two of these cases the bacteriological findings were negative, and the deaths were recorded from the pathological evidence as being due to gastro-enteritis; in the other two cases it was ascertained that a bacillary dysentery had been the cause.

In view of this sequence of dysenteric infections, a circular was issued on April 18th by the medical officer of health for the city, requesting practitioners to notify any severe cases of acute enteritis which they might encounter in their practices. All cases notified were carefully investigated, and any with signs or symptoms suggestive of dysentery were removed to the City Hospital for Infectious Diseases. Stools, &c., were bacteriologically examined, not as a routine, but wherever the history of the case seemed to indicate its advisability. Up to June 30th, 64 notifications from all sources had yielded 17 cases of bacillary dysentery with two deaths. Of the 47 non-dysenteric cases notified, four died, but only one was brought to post-mortem examination. In this, as in the other three, death was returned under the omnibus term of gastro-enteritis. For the period March 1st to June 30th there are thus records of 22 cases of dysentery, all bacteriologically proven, four of which have terminated fatally. These 22 cases have been found in 15 separate households. The sex and age-distribution of the cases were as follows:—

Thirteen, or 59 per cent., were in females, with one death, representing a female case mortality-rate of 7·7 per cent. The remaining nine cases were males. Three died—a male case mortality-rate of 33·3 per cent. There were no cases under the age of 12 months, two were under 2 years, three in the age-period 2–5, ten from 6–10, one from 11–15, and six above the age of 20. Three deaths occurred in the age-period 6–10, and one from 11–15.

Clinical Features.

Two very different types of the infection were encountered, the one mild from the beginning—a simple dysentery—the other fulminant and fatal, suggesting the form of the disease known as entero-dysentery.

Mild Cases.—The average length of stay in hospital of ten non-fatal cases was 18 days, and this period was sufficient to cure symptoms, establish convalescence, and prove the disappearance of the infecting organisms from the stools. The ordinary clinical history is as follows: The onset is gradual with headache, occasionally associated with vomiting. Within a few hours diarrhœa commences, and generally the first motions are loose and fæcal. The bowel is soon emptied of fæcal contents, and thereafter the motions are almost pure mucus with varying quantities of blood. "Jelly and blood" is a graphic description of the motion frequently obtained by the history-taker, though the true red-currant jelly stool of dysentery has been seen only on one or two occasions. The diarrhœa is very frequent—every 20 or 30 minutes—40 to 60 stools in the 24 hours, and this stage may last for four or five days, unless treatment has been adopted. Even after treatment has been commenced the cessation of diarrhœa is gradual, and there is generally some looseness of the bowels with brown and grumous motions up to about the tenth day. Throughout the diarrhœic stage colicky pains are invariably present in greater or less degree, and are relieved by the passage of stools. Tenesmus has been complained of in the majority of cases. Abnormal abdominal distension was not observed in any case. Some indefinite tenderness over the pelvis is frequently elicited, but pain on pressure over the descending colon was never obtained. Enlargement of the spleen was only found in one patient. Slight furring of the tongue is generally present.

The bronchitic signs described in Sonne infection by the Aberdeen observers were absent in the few cases concerned.[4] The temperature is elevated—generally from 99°–100° F. in the evening, and about 1° less in the morning. There is a progressive defervescence, and about the tenth day, coincident with the improvement in the intestinal condition, the temperature is usually normal, and convalescence is assumed to have begun. About two days after this the bacteriological examination of another stool is commenced, and by the time the report on this is available (i.e., five to seven days) the patient is generally fit for discharge.

The latest date on which dysentery bacilli have been found in the stools was the tenth day of the disease, but this only happened in one case, and as a rule they have rarely been obtained later than the sixth day—the first three days being the most favourable for their isolation. On two occasions when multiple clinical cases have occurred in a household, the stool has only been positive in one case, but the blood serum of another taken at a later date has agglutinated the organism from the stool of the positive case in high dilution. There have been no relapses in hospital, nor, as far as could be ascertained by routine inquiry, after discharge. Treatment has been largely symptomatic, and sodium sulphate in doses of from grs. 40–60 three times a day has been adopted as a routine in the first four or five days.

Fulminant Cases.—In this type of the disease, the onset, development of symptoms, and death have followed one another so swiftly that the average duration of such a case has been less than 24 hours. The onset is extremely sudden, and as in the mild type headache has been common; vomiting, moreover, has been an invariable symptom. Colicky pains and diarrhœa with mucus and blood have followed. The number of such stools has usually been relatively few—perhaps about ten or a dozen—and their appearance was that of a mixture of fæcal material, blood,

and mucus, rather than the "jelly and blood" characteristic of the mild type of the disease. Abdominal distension, tenderness, and rigidity of the muscles on palpation were not present in any of the cases. The spleen was never found to be enlarged on clinical examination.

In two cases only have temperature records been obtainable, and in these the pyrexial reaction was higher (101°–102°) than in the milder type. Drowsiness, passing into coma, has preceded the fatal issue. In general it may be said that these fatal cases have been associated with a degree of toxic infection altogether out of proportion to the symptoms.

Post-mortem Appearances.

Post-mortem examinations which were made in all the fatal cases showed the same general pathological appearances in every case.

In every case there has been an enteritis and a colitis—the former condition predominating. The inflammatory changes have been most marked in the lower one-third of the ileum, though in one case it was the upper part of the jejunum which appeared to be chiefly affected. Engorgement of the blood-vessels in the wall of the gut has been the principal external sign, and the peritoneal reaction has never gone beyond this hyperæmic stage. Internally there has been evidence of a folliculitis, passing on to follicular ulceration. The Peyer's patches in the main have not been affected.

There have been no signs of chronic thickening of the bowel wall, but recent œdematous changes have been constant. The condition of the colon has generally been similar to that of the intestine though in a minor degree. A slight gastritis was present in some of the cases. A presumably acute lymphadenitis of the mesenteric glands was found in one case, and the spleen was definitely enlarged in another. Toxic changes were invariably present in the heart, kidneys, and liver.

The results of the bacteriological examinations of fæces, blood, and post-mortem specimens will be considered later.

Epidemiological Features and Spread of the Disease.

Distribution and Chronology of the Outbreaks.—The 22 cases recorded occurred in 15 separate domiciliary outbreaks. There were ten outbreaks made up of single cases; three multiple groups of two cases each; and two where three patients were affected. The chronological order and date of commencement of each of the outbreaks is given in Table II. Cases and outbreaks occurred in nine of the 19 wards of the city (population 288,500), but although there has been a multiple incidence in certain wards, in no instance have there been two outbreaks in one street. In fact, after the closest investigation and interrogation of all facts and persons concerned, it may be said quite definitely that there has never been any known contact between one affected family and another, either domestically, scholastically, or otherwise.

Water.—The water common to all these cases for the purposes of drinking and ablution was that of the Newcastle and Gateshead Water Company, a supply obtained from upland sources, stored, filtered, and chlorinated. It is usually of high quality judged both by chemical and bacteriological standards. Samples of water taken from each house without sterilisation of the tap were satisfactory in all but five. In three of these *B. coli* were present in 1 c.cm.; in two specimens in 10 c.cm. In no case were streptococci present. Neither the series of outbreaks as a whole, nor any individual focus presented the features of a water-borne epidemic, and in view of this and the known feeble viability of *B. dysenteriæ* under saprophytic conditions, little significance is attached to these findings of dirty waters, though to a certain extent they act as an index of the general hygienic standard of the dwelling.

Milk.—Only in five cases was fresh milk an article of diet in the household. In four cow's milk was used, in the remaining one goat's milk. The milk had been boiled in only one instance. The purveyors of these milks were all different, and as far as could be ascertained the sources of supply were entirely independent. In the remaining cases tinned milks were in regular daily use, and the patronage of the various brands appears to have been very catholic, no fewer than ten different varieties being consumed.

Milk products, &c.—In view of the variety of brands of butter and margarine used there is nothing to suggest their relationship to the outbreaks.

Ice-cream.—A history of eating ice-cream was only given in two of the outbreaks. In each of these cases—one of which proved fatal—it had been consumed the day before the sickness commenced, and had been obtained from diverse sources.

Prepared meats.—Brawn, potted meat, galantine, &c., were not eaten by any of the patients affected. Two patients in separate outbreaks gave a history of eating respectively corned beef and tinned tongue. These meats came from different shops, and in both instances were partaken of by others who suffered no ill-effects.

Shell-fish.—One fatal case had a few whelks on the day of the onset of illness. Others similarly indulging in the same and adjacent houses were unaffected.

Watercress, salads, unwashed fruits were not implicated in any of the outbreaks.

Flies were a negligible feature of both domestic and outdoor life during the period under review.

Epizoötics.—Careful inquiry was made as to the degree of rodent infestation of the affected houses. This was negligible, nor was there any evidence of any epizoötic, such as might be shown by the presence of dead rats or mice, or diarrhœic indications of an intestinal complaint.

Sanitary conditions were fairly good. Water-closets were fitted on all the premises, and dry refuse was removed periodically under corporation arrangements.

Contact with other cases or carriers.—As has been stated above, there has been no evidence of any contact between one infected household and another, either directly or through intermediaries. In two instances an apparently healthy member of the household gave a history of a previous attack of dysentery, one in South America in 1913, the other while serving in France in 1916. Neither of these persons had anything to do with the preparation of the family's food, and their stools when examined were negative for the dysentery group.

One incident remains to be recorded for what it is worth. From a small domiciliary group of three cases an agglutinable Sonne dysentery bacillus was isolated. One patient—a boy of 11—died, and the other two, though attacked at the same time, manifested only the very slightest symptoms. About six weeks prior to this a playmate of the boy had died suddenly in the flat above, with symptoms suggestive of dysentery. The macroscopic appearances at post-mortem examination were those of entero-dysentery, but unfortunately the specimens obtained were useless for bacteriological purposes, and accordingly this case has not been included in the present series. The only suggestive facts are that the father of this latter boy had suffered from diarrhœa on the day of his son's death, and that he had but recently returned from Glasgow—a Sonne infected area. His stools when tested at a later date were negative.

Overcrowding.—The houses affected were a rather less than average sample of the dwellings occupied by the working classes of the city. Some were tenement property in comparatively poor neighbourhoods, others were modern habitations recently constructed under corporation town-planning schemes. On a standard of two persons per room, 51 of the total number of 94 inhabitants were overcrowded, a percentage of 54, compared with the average overcrowding of 33·6 per cent., which held in Newcastle at the time of the 1921 census. The relation between overcrowding and the incidence of diseases of the diarrhœa type does not require to be emphasised here.

Climatic conditions.—There was nothing exceptional in the climatic conditions for the time of the year.

Up to this point these cases of bacillary dysentery have been treated as if one, and only one member of that group of organisms had been the cause of the whole series of focal outbreaks. The bacteriological evidence, however, shows that no fewer than five types of dysentery bacilli, or of organisms so closely allied as to be grouped with them, have acted as the "materies morbi" in these cases.

Bacteriological Data.

Only the essential features of these laboratory findings will be recorded here, as they form the material for a bacteriological review of the outbreaks, which is in course of preparation by the investigators concerned.

A brief statement of the standards adopted as diagnostic, and an enumeration and distribution of the organisms implicated, are, however, necessary for the purpose of this article. All examinations of clinical and post-mortem material were carried out in the Routine Department of the University of Durham College of Medicine Bacteriological Laboratory by or under the direction of Dr. F. H. A. Clayton.

1. Every case of dysentery in this series was a positive bacillary case in the sense that (*a*) an undisputed dysentery-causing bacillus was obtained from

its stools, or (*b*) its blood-serum agglutinated not only a standardised emulsion of a dysentery organism, but also an identically similar organism found in the stools of another patient in the same household.

2. As a result of these investigations the following five organisms have been discovered amongst the 22 cases of dysentery:—

(*a*) Three out of the five commonly accepted serological types of *B. dysenteriæ* Flexner—namely, W, Z, and one which agglutinated X and Y strains equally and is in consequence referred to as XY. Type V was not found in the present series.

(*b*) A Sonne bacillus, and an inagglutinable variant of the same.

(*c*) A so-called para-Shiga organism. This designation was applied because it is not agglutinated by Shiga serum, although it shows the fermentation reactions of that organism, causes dysenteric symptoms, and has been isolated from a fatal case. A very similar, if not identical, bacillus was isolated from a case of clinical dysentery in Newcastle in September, 1925, and in May of this year from an outbreak of about 20 mild cases of the disease in the Cripples Home at Gosforth, one mile outside the boundaries of the city. A description of this organism is being published by Dr. Clayton and Dr. S. H. Warren, of the University Laboratory. Neither of these other foci could be associated in any way with the two cases in the present series.

It is important to note that wherever multiple infections have occurred in a household, the type of the causal organism has remained the same for all the cases therein.

TABLE I.

Type of organism.	Flexner.				Para-Shiga.	Sonne.
	V.	W.	XY.	Z.		
Organism isolated from stools	—	3	2	4	—	3*
As above, and agglutinated by patient's own serum ..	—	—	—	2	—	—
Blood-serum, tested against standard Oxford emulsion, and/or organism from case in same household	—	—	—	3	1	—
Organism isolated from P.-M. material	—	1	1	—	1	1
Totals	—	4	3	9	2	4

GRAND TOTAL .. 22 cases in 15 outbreaks.

* 1 inagglutinable.

Flexner W caused 4 outbreaks, XY 2, Z 6, para-Shiga 1, Sonne 2.

Table I. gives the distribution of the five organisms amongst the 22 cases, and also shows the sources from which they were obtained.

Table II. is included as a matter of interest. It shows the chronological order of the 15 outbreaks, their dates, neighbourhood, and the type of the infecting bacilli. It demonstrates, amongst other things, that the first seven outbreaks sprang up in different wards; that there were never two consecutive outbreaks in the same ward, and where one type of organism was implicated in successive outbreaks the infected localities were, of course, not the same.

The interrelations of the various dysentery bacilli are still somewhat ill-defined. It would appear to be generally accepted that Shiga and Sonne are distinct organisms, with well-marked serological and biological properties which they hand on through many generations. On the other hand, the fermentation reactions of the Flexner group, though of considerable importance, are not quite reliable enough to be used alone for purposes of differentiation. Accordingly, bacteriologists have developed their already considerable knowledge of the more stable distinguishing features of these several organisms, which could be found in their reactions to immune sera. These agglutination tests do not invariably yield clear-cut and definite lines of demarcation between the five or more strains—V, W, X, Y, Z, &c.—into which the Flexner group has been subdivided serologically, but they are sufficient for most practical purposes.

Whether in course of time these serological types alter and change one into another is not known. At any rate in the present investigation wherever multiple cases have occurred in houses there has been no

TABLE II.

Serial No.	Ward.	Type of organism.	Date.	Serial No.	Ward.	Type of organism.	Date.
1	F.	Z.	Mar. 2	9	W.	Z.	May 15
2	S.	XY.	,, 24	10	Arm.	Sonne.	,, 20
3	J.	W.	,, 27	11	F.	XY.	,, 31
4	W.	W.	Apr. 25	12	W.	Sonne.	June 5
5	Ben.	Z.	,, 28	13	Ben.	Z.	,, 12
6	Anth.	Z.	,, 28	14	Byk.	Z.	,, 19
7	And.	W.	May 7	15	W.	Para-Shiga.	,, 29
8	J.	W.	,, 9				

Abbreviations for Wards.—And., St. Andrew's; Anth., St. Anthony's; Arm., Armstrong; Ben., Benwell; Byk., Byker; F., Fenham; J., St. John's; S., Stephenson; W., Westgate.

evidence of such transmutation of type. Nor is there any reason to believe that what holds good for these multiple cases does not similarly apply to the single cases throughout the series.

Discussion.

In considering these 22 cases an attempt was first made to regard them simply as "bacillary dysenteries" without differentiating the type of causal bacillus. For a time it was convenient to imagine them as arising from one source, and following in one sequence. But on further scrutiny not only was it necessary to recognise the diversity of the infecting organisms, but also that there was no definable factor common to all the cases, and that there was nothing wherewith one could connect them together in a consecutive series. Arranged in five groups corresponding to their causal organisms, these outbreaks still failed on the most careful investigation to divulge any other common feature which might facilitate an understanding of the incidence and spread of the disease. And, finally, the attempts made to link up any individual outbreak with another have proved unsuccessful.

Relying on the evidence available, and allowing as auxiliary predisposing factors the obvious overcrowding, and the proved facilities for easy contamination of water and food which arise under these conditions, one is reluctantly compelled to admit that apart from the thesis that these outbreaks of dysentery are certainly a sporadic, and possibly an endemic manifestation of the disease, there is no other explanation easily acceptable at the moment. How exactly the disease arises, and what part intermittent carriers and the even more dangerous latent case, as described by Cunningham, have played in the spread of the disease it is impossible to say. The amount of material at one's disposal is not sufficient. It would appear an entirely feasible hypothesis that in certain cases following upon some dietetic indiscretion, the quiet "carrier" has become actively dangerous, perhaps even personally ill, and that other cases in the same household, some of acute dysentery, others of transient diarrhœa, have been the result. Sporadic dysentery in itself is nothing new; it has been described in this country by many observers, amongst others by Saundby in Birmingham (1906),[5] Bainbridge and Dudfield in Paddington (1911),[6] and Severn and Evans in Smethwick (1928).[7] The interest of the present series lies in the variety of organisms at work, and in the way in which the sporadic elements have become so frequent as to attain the dimensions of an endemic.

Several questions arise—many of which cannot be answered at the present moment. They are, nevertheless, stimulating in their suggestion of fresh avenues of inquiry. It will be remembered how Creighton pursued the records of dysentery across a century, and found cases which were at one time well and truly recorded as "griping of the guts," later

masquerading as "convulsions."[1] And probably in a measure the same is true to-day. Diarrhœa, the "omnibus" diagnosis, has no doubt regained the allegiance of many of the dysenteries, and ulcerative colitis, a comparative newcomer, may have acquired some of the remainder. A search of the death returns for the last six years, under the headings of dysentery, diarrhœa, and the allied diseases, has given for Newcastle a limited amount of "data," which on strict statistical inquiry and analysis may show whether this sporadic or endemic dysentery is a normal feature of life and death in Newcastle. But apart from these retrospective inquiries, extensive observations on normal living material are necessary. What percentage of the ordinary population intermittently excrete dysentery bacilli in their stools? How many people are there with well-marked agglutinins for the dysentery group in their blood? The former percentage would give us some idea of the number and significance of the dysentery carrier; the latter figure should show the extent of past infection. These data have been obtained before but separately, or from communities (e.g., mental hospitals) which cannot be accepted as normal. The work of Schorer,[8] Ritchie,[9] and Pickworth[10] along these lines urgently requires to be extended.

Other questions, not so important perhaps, but equally fascinating come to mind. If this is not a true endemic, is it the beginning of an epidemic? Are these sporadic foci due to five types of bacillus, the first potential centres of an epidemic outbreak? Why should five types of organisms have simultaneously made their presence so manifest? Have these organisms been with us all the time, and is there now some failure of the natural immunity of certain members of the population? Have the protective properties of the bacteriophage become enfeebled? Has there been some transmutation of certain forms of bacterial life? The main object, however, of this article has been to draw attention to the series of cases of dysentery which have occurred in Newcastle, in the hope that other observers may inquire whether such a condition of affairs is present elsewhere.

My acknowledgments and thanks are due to Prof. Harold Kerr, medical officer of health of Newcastle-upon-Tyne, for permission to publish this report, and for much interest and assistance in its preparation.

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BUXTON MEDICAL RESEARCH SOCIETY.—At a meeting held on Sept. 7th at the Devonshire Hospital Mr. J. Race, biochemist to the hospital, communicated the result of an analysis, made by Dr. Judd Lewis, of the gases issuing from St. Anne's Well, showing the rare gases to be 1·20 per cent. of the total volume, made up of argon 96·6 per cent. and helium 3·4 per cent. The absence of neon is an interesting feature of the analysis, as it appeared to exclude atmospheric air as a source of the helium and afforded a sharp contrast with the gas at Bath which, like atmospheric air, contained considerably more neon than helium. The output of radium emanation in the gas had been estimated at 3000 milli-micro curies per hour. Seeds soaked in the radio-active Buxton water germinated quicker and grew more rapidly than in either tap water or in a natural water practically identical in composition with the Buxton water but free from radium. The waters, he said, were all adjusted to the same pH before use.

VIENNA.

(FROM OUR OWN CORRESPONDENT.)

Unequal Distribution of Doctors.

A RECENT publication shows how many medical men there are in the six central European States which derive all or part of their territory from the old Austro-Hungarian Empire. From the data given, which were compiled for other purposes, the following figures may be quoted as indicating the unequal distribution of practitioners in these countries:—

—	Population.	Practitioners.	No. of inhabitants per practitioner.
Jugoslavia ..	12,000,000	2100	5700
Roumania	16,000,000	3000	5300
Poland	7,000,000	2200	3200
Czecho-Slovakia ..	13,500,000	6800	1970
Hungary	8,000,000	5400	1480
Austria	6,500,000	7300	900

This makes it painfully clear that the situation of the medical profession in Austria is worse than in any of the other States; even wealthy Czecho-Slovakia, with more than double our population, has far fewer doctors to compete with one another than there are here. Austria's poverty and economic depression obviously justify the authorities in their endeavour to prevent or diminish the matriculation of medical students.

The Principal Causes of Deaths in Vienna.

From the report of the Vienna Board of Health for the first half of this year it appears that tuberculosis no longer holds first place among the causes of mortality. Pulmonary tubercle—the other forms do not play a significant part in these statistics—was responsible in 1918 for 22·5 per cent. of all deaths in the city, and in 1920 for 18·6; but by 1926 the percentage had fallen to 13·7, and in the past six months it has been only 12·3, which is very gratifying. No doubt the decline is due to the remarkable improvement in housing effected by the present municipal government, and also to instruction of the public concerning the hygienic importance of light and air, and the necessity for isolating phthisical patients. Further, the increase of tuberculosis centres and sanatoriums has a very beneficial effect upon "open" cases. Thus it comes that diseases of the heart and circulation now take precedence over tuberculosis as causes of death. Whilst it is by no means certain that these pathological conditions have absolutely increased in Vienna, their prevalence may be an after-effect of the war, now becoming more distinctly manifest. This is probably true of wear-and-tear diseases such as arterio-sclerosis.

Doppler's Method of Reactivating Viscera.

For some three years, as I have already mentioned,[1] Dr. Karl Doppler has been making extensive use of a method of reorganising visceral blood-supply, based on a technique devised by Leriche for increasing the circulation in paralysed legs. On dividing the sympathetic nerves accompanying the blood-vessels of the limbs, and thus destroying the vaso-constrictor branches, Leriche obtained improvement, albeit temporary, in the circulation, and Doppler's technique is based on his observation that a similar result can be got by painting the adventitia of the blood-vessels with a 7 per cent. solution of phenol. He first tried this method in a case of badly healing gastric ulcer and the result was promptly satisfactory. Then he used it wherever it seemed desirable to stimulate a too sluggish blood-supply, and it is true that he—and many other surgeons who used his carbolic solution—got very good results. Encouraged by these experiments, Doppler started using the method for increasing

[1] THE LANCET, 1928, i., 467.

the blood-supply, and thus promoting the functional activity, of the testes and ovaries. For this process he strictly repudiates any use of the term rejuvenation. He calls it a "regenerative" method, and together with Prof. Hans Lorenz—not the orthopædic surgeon—he has used it in a large number of cases, in which the effect has undoubtedly been very beneficial in certain respects, whilst the operation itself is very simple and easily performed. A distinct return of muscular strength and mental activity, with growth of hair and even return of its normal colour, has been observed by many surgeons. The duration of the effect is not yet known; as a rule, it seems to be two years at least, although sometimes repetition of the operation has been required within that period. There are also, of course, refractory cases, and the treatment cannot be expected to do much good if the organ under stimulation has been irreparably damaged so that its glandular tissue has atrophied. Attempts have so far been made to reactivate the liver, the kidneys, the ovary, and the testes; experiments are now going on with regard to the thyroid and suprarenal glands. The physiological basis of the method is now thoroughly understood. The carbolic solution destroys—much better than a knife—certain nerve-tissues, and at the same time sets up a process which prevents the formation of new nerves after the original destruction, at any rate for two or three years. The 7 per cent. solution acts chiefly on the vaso-constrictors, the vaso-dilators being much more resistant. The method is now being widely tried all over Vienna, but results are not being given to the public as Dr. Doppler wishes to make certain of his facts as far as possible before making further claims.

NOTES FROM INDIA.

(FROM OUR OWN CORRESPONDENT.)

A Medical Register for India.

NEWSPAPER reports that the Government of India intend to bring before the forthcoming session of the Central Legislature a Bill to regulate medical education in India by the establishment of a Medical Council and the maintenance of a Medical Register have evoked mild protest from the Bengal Medical Association and one or two other quarters. More than one medical circle has declared that the time has not yet come for the establishment of an Indian Medical Council, and that it would not be easy to control provincial medical councils by a centrally constituted organisation.

The question whether there is need for setting up a central organisation has been engaging the attention of medical faculties and other such associations for at least a decade. Indeed, it has been revived and pressed upon the Government more than once since 1919, but apparently the Government have hitherto not been kindly disposed to the demand. Possibly their want of sympathy was due to the fact that all provincial governments were not of one mind on the question. It has, in fact, been stated in a well-informed quarter that three of the local governments were against the proposal. This, and perhaps the usual financial difficulties, might have stood in the way of the Central Government taking any bold step, but events since then have been distinctly in favour of a definite forward move.

The Bill which has now been prepared by the Government of India can be said to be a comprehensive measure which aims at making India autonomous in regard to medical qualifications based on the Western system. Its object is said to be the creation of a Central Council which will establish a uniform standard of qualification in medicine for all provinces so that holders thereof may be empowered to practise throughout British India, and it will be the sole authority to regulate, on a footing of reciprocity, the conditions on which qualifications acquired abroad are to be recognised in India.

Bengal's Poor Health.

The deterioration of the public health of Bengal is emphasised in a recent address by the Director of Public Health of the province. For this state of affairs improper and inadequate food is largely responsible. The annual mortality for the province is about a million and a half, and deaths of children under the age of 15 make up no less than 50 per cent. of the total. In 1927 no fewer than 120,000 people died of cholera in Bengal; the mortality from malaria was 350,000; reported deaths from enteric vary annually between 50,000 and 100,000, while deaths from tuberculosis total about 100,000. In all probability there are at least half a million sufferers from tuberculosis in the province. The infantile death-rate is appalling, and on the average 55,000 newly-born children die of tetanus every year.

Dangerous Drugs.

There is every likelihood of the Government of India introducing a Bill in the autumn session of the Central Legislature regarding dangerous drugs. This Bill is rendered necessary in view of certain obligations undertaken by the Government under the Geneva Dangerous Drugs Convention of 1925. It is not known at what stage the Bill is now, but it will be published in the *Gazette* shortly before the commencement of the September session. As, however, the measure in its application will concern a large number of provinces in India, it is likely that soon after the introduction in the Legislature a motion will be made for circulating the Bill to local governments for opinion. This means that further progress will not be made till the next winter session in Delhi.

Wild Animals.

The total number of persons returned as killed by wild animals (other than snakes) in British India during the year was 2285, as against 1955 in the previous year and 1962 in 1925. Tigers were responsible for 1033 of these deaths, leopards for 218, wolves for 465, bears for 78, elephants for 56, and hyenas for 12. Deaths were highest from tigers and leopards in Madras, from wolves in the United Provinces, from bears in Bihar and Orissa, and from elephants in Assam. Of 423 deaths from "other animals" about 136 are assigned to crocodiles, 85 to wild boars and pigs, and 41 to jackals. The highest number of deaths from all wild animals occurred in the Madras Presidency (579), the United Provinces, Bihar and Orissa, and the Central Provinces and Berar coming next in order. During the year 25,612 wild animals were reported as having been destroyed, including 1368 tigers, 4390 leopards, 2739 bears, and 2439 wolves.

Deaths from snake-bite decreased from 19,724 to 19,069, the number of snakes destroyed in India proper increasing during the same period from 46,012 to 57,116.

MEDICINE AND THE LAW.

Dangerous Drugs Regulations.

ATTENTION was recently drawn [1] to the Order in Council which at last brought into operation the Dangerous Drugs Act, 1925. That Act provided a new definition of the drugs to which Part III. of the 1920 legislation applied, and another Order in Council of the same date applied Part III. to certain specified preparations. The Home Secretary has now made two sets of regulations dealing with these preparations. The first set regulates the manufacture, supply, possession, &c., of benzoyl-morphine under licence. The other extends the Dangerous Drugs Regulations of 1921 to dihydro-oxycodeinone and dihydrocodeinone and their respective salts, and requires that separate registers (or separate parts of the register) be kept in respect of these preparations. These two recent sets of regulations are what is called Provisional

[1] THE LANCET, Sept. 1st, p. 475.

Regulations. This name merely implies that, on certified grounds of urgency, the Home Office is entitled to make the regulations without giving the usual 40 days' notice of his intention under Section 1 of the Rules Publication Act of 1893, and without waiting to collect the observations of persons interested upon his proposals. The Provisional Regulations have meanwhile (and until the Regulations are made, after the full preliminaries of notifying intention and collecting criticisms, as Statutory Rules and Orders) just as complete validity as if they were "Statutory" and not "Provisional."

A Promising Advertisement.

A cutting from a Malayan newspaper contains an advertisement (with portrait) of a "Burmese specialist," giving an address in Kuala Lumpur, who, having had 35 years' practice at Rangoon, begs to notify the public that he is able to cure a number of specified diseases. The list ranges from hiccough, hoarseness, and indigestion to madness, paralysis, asthma, and leprosy. "Persons affected with evil spirits or charms could be released; guarantee to cure diabetes within two months." The announcement may not be taken seriously by western readers, but can we say that similar advertisements have entirely disappeared from the columns of English newspapers? Parliament has prohibited them so far as they relate to venereal disease; they might be, though they seldom are, the subject of criminal proceedings in so far as they incite to or abet abortion. Otherwise there is nothing—except the general spread of education—to restrict the advertisement of promised cures. The vendors' descriptions of patent medicines seldom understate their claims.

An Osteopath Prosecuted.

But while an eastern journal publishes such an advertisement, the eastern courts may be found taking proceedings against a development which is entirely western. A Kuala Lumpur newspaper of July 30th records the prosecution and conviction at Colombo of Mrs. Starr for practising osteopathy—or, to be exact, for having during April and May last, practised medicine and surgery for gain without having registered herself as a practitioner under Ordinance 2 of 1905. Mrs. Starr, described as a manipulative therapist, had, it appears, given treatment of a kind associated with the practice of osteopathy. Her counsel argued that the treatment was a sort of massage, neither medicine nor surgery, that massage is not a branch of surgery but an aid to surgery, and that consequently the manipulative treatment given (in the case charged a manipulative treatment of the spine) did not offend against the Ordinance. The magistrate examined various dictionary definitions of osteopathy. He observed that massage was undoubtedly an aid to medicine and surgery, but remarked that osteopaths worked on a different plane. They claimed to diagnose and remedy disease; their methods were more drastic and far-reaching than those of the masseur. The osteopath is not so much a humble auxiliary of the qualified practitioner as a substitute and sometimes even a rival; he is not an assistant but a principal. Osteopathy, said the magistrate, is a particular branch of manipulative surgery; Mrs. Starr practised surgery in administering manipulative treatment. He fined her the nominal sum of 25 rupees, having taken into account the facts that she had practised her profession openly for some years in Colombo and elsewhere without interference or objection, that she was stated to have given relief to certain patients where qualified doctors had failed, and that she might have been legally entitled to practise in other parts of the world, and therefore possibly was unaware of the Ordinance under which she was being prosecuted. The magistrate then added certain general observations of considerable interest. The legal position, he said, seemed to be that the practice of osteopathy was not proscribed in Ceylon, but that only practitioners qualified and registered as physicians and surgeons could practise osteopathy. "I think it would be true to say that the medical profession admits in theory the great value of osteopathy, a branch of manipulative surgery, in the treatment of certain injuries in carefully selected cases: but it is probably also true that no members of the medical profession in Ceylon are qualified osteopaths." The practical result was that, at the moment, if any patient in Ceylon had an ailment which could only be remedied by osteopathic treatment, he or she could not obtain such treatment. There was, however, another important consideration. It had been alleged that Mrs. Starr was treating her patient for infantile paralysis when in fact the ailment was malaria. The judicial medical officer had attested that the patient died of heart failure from excessively high temperature due to malaria. His final pronouncement summed up the position clearly. "What in any event is obvious, is the great danger that exists in allowing a person, unqualified save in one particular branch of surgery, to attempt to diagnose every type of disease and ailment; it is unreasonable to suppose that the one remedy of manipulative surgery is a suitable prescription for every type of disease, and the great danger that lies in the prescription of such a remedy where it is unsuitable is patent."

The Services.

ROYAL NAVAL MEDICAL SERVICE.

H. L. Pridham to be Surg. Lt.

The following appointments have been notified:—Surg. Comdrs.: H. B. Padwick to *President* for post-graduate course; and R. A. W. Ford and J. C. Sinclair to *President* for R.N. Medical Store Depôt, Deptford, for survey of stores. Surg. Lts.: E. J. K. Weeks to *Victory* for R.N. Barracks, Portsmouth; and H. W. Strong to *Fisgard*.

ROYAL NAVAL VOLUNTEER RESERVE.

Surg. Lt. D. A. Imrie to *Victory* for R.N. Hospital, Haslar, for training.

Surg. Lt. (D.) E. D. Collins to *Vivid* for R.N. Barracks, addl. for training.

Surg. Sub-Lt. D. S. Buchanan promoted to Surg. Lt.

Proby. Surg. Sub-Lt. H. E. Holling and R. H. Wheeler to *Victory* for R.N. Hospital, Haslar, for training.

ROYAL ARMY MEDICAL CORPS.

Lt.-Col. R. L. V. Foster retires on retd. pay.

Majs. to be Lt.-Cols.: G. S. Wallace, vice Lt.-Col. B. B. Burke, promoted; C. J. Coppinger, vice Lt.-Col. R. L. V. Foster.

W. D. Hughes to be Lt. on prob.

TERRITORIAL ARMY.

Lts. W. S. C. Copeman and K. V. Milburn to be Capts.

ROYAL AIR FORCE.

Flying Officer J. Hutchieson is granted a permanent commission in this rank.

Flight Lt. (Hon. Squadron Leader) G. S. Ware relinquishes his temporary commission on completion of service, and is permitted to retain the honorary rank of Squadron Leader.

DEATHS IN THE SERVICES.

Col. LLEWELLYN THOMAS MANLY NASH, C.M.G., R.A.M.C., retd., who died on Sept. 9th at the Queen Alexandra Military Hospital, Milbank, London, aged 67 years, received his medical education at the Royal College of Surgeons, Ireland, and at the Rotunda Hospital. He was appointed surgeon in the R.A.M.C. in 1885, and served with the Miranzai Expedition in India (mentioned in despatches and medal with clasp) and also with the Hazara Expedition (clasp). He reached the rank of major in 1897, and that of Lt.-Colonel in 1905. In the late war he took command of No. 8 General Hospital at Rouen in August, 1914, and was later A.D.M.S. of the 8th Division (twice mentioned in despatches and created C.M.G.). In 1915 he returned to England, owing to ill-health, and was subsequently appointed to headquarters in the Eastern Command. At the end of 1916 he organised the R.A.M.C. centre at Blackpool with marked success. In 1917 he was appointed A.D.M.S. in Sussex. His genial disposition and tactful manner brought him many friends in civil as well as military life who will deeply regret his death. Col. Nash married in 1901 Edith Gertrude, daughter of the Rev. Charles Sloggett.

BRITISH MEDICAL ASSOCIATION.

ANNUAL MEETING AT CARDIFF.

(*Continued from p. 578.*)

SECTION OF LARYNGOLOGY AND OTOLOGY.

CHRONIC ETHMOIDITIS.

Dr. ROSS SKILLERN (Philadelphia), in his opening paper, said that chronic infections of the ethmoid could be broadly divided into suppurative and non-suppurative. With regard to the suppurative variety, the exudate varied from a thin watery to a thick yellow discharge, and this variation occurring in the same case, while the patient attributed it to the acquisition of fresh colds, was really due to exacerbations of his chronic condition. The discharge at times became so thin and scanty as to lead the patient to believe that a cure was in process. The final result, however, was a constant purulent secretion.

The *non-suppurative type* was characterised by polypoid formations unaccompanied by true leucocytic pus. This hyperplastic ethmoiditis, while distinct pathologically from the suppurative variety, did not preclude a combination of both types. In fact, the probability of suppuration was in direct proportion to the extent of hyperplasia. Saprophytes were more likely to find a suitable growth medium when polyposis was present. The *suppurative type* might be subdivided into suppuration affecting the anterior cells or the posterior or a combined suppuration of anterior and posterior. Suppuration of the anterior cells as an individual entity did not exist save with one exception. He had not seen this condition apart from accompanying affection of the frontal sinus. The exception referred to was infection of the bulla ethmoidalis, and even then an abscessed bulla was often associated with infection of other cells. Infection of the posterior cells was more frequent, because they were larger and more numerous, and they were so situated as to be less amenable to aeration. Their drainage could easily be interfered with by a slight swelling of the mucosa and their situation prevented easy exact diagnostic instrumentation. So slightly were they disturbed by inspiratory air currents that they offered an excellent medium for microbic growth. The combined anterior and posterior infection was usually an acute infection in contra-distinction to the gradual insidious infection of the separate anterior or posterior cell types. The *hyperplastic types* varied from a slight degeneration of the lower border of the middle turbinate, to the formation of large sessile polypi. Actual polypi appeared to originate from the body of the ethmoid or the uncinate process. He had never seen a large polyp originating from the lower border of the middle turbinate. The anterior labyrinth was the seat of large extracellular hypertrophies, while in the posterior labyrinth the intracellular variety was the rule. The so-called choanal polyp sprang from the mucosa of the maxillary antrum. In old chronic cases the entire ethmoid became converted into one mass of polypoid degeneration. In such cases there was a profuse watery secretion, which did not stain linen. Staphylococcic infections appearing in cycles produced thick yellow secretions. The true combined form only became permanent when the organisms found lodgment deep in the mucosa.

Treatment had for its basic principles aeration and drainage. Complete removal of all infected tissue was unnecessary. At one time he was prone to overdo the removal. Drainage was the duty, while ventilation, although desirable, was not indispensable. Oft-times haphazard procedures only left an area of debris, which degenerated into a disorganised suppurating mass. In simple catarrhal infection, removal of the middle turbinate was almost a sine qua non; first, to permit thorough aeration, and secondly to make possible the application of medicaments. In some cases he had found it necessary to resect part of the septum, so that the middle turbinate could no longer swell and compress the ethmoid. Five days after removal of the turbinate tampon treatment was instituted. Cotton tampons saturated with a 10 to 20 per cent. silver preparation, dissolved in equal parts of water and glycerine, were used and allowed to remain in situ at least five hours. The solution should be warm and freshly made. The tampons at first were used every other day, and later with decreasing frequency. Suppuration in the anterior cells often required that the frontal sinus should be cleared of infection. An abscessed bulla could be treated by opening its floor. Suppuration in the posterior cells was difficult to detect even with the nasopharyngoscope, but one clue was always at hand and that was the hypertrophied and mottled appearance of the middle turbinate. In treatment the middle turbinate should be removed, and obviously diseased cells should be opened up, following which the tampon treatment should be carried out. Suppuration of the entire labyrinth required a complete exenteration. In doing so, the preliminary removal of the uncinate process with a flat chisel was advisable. After this had been done the posterior cells could be methodically resected. It was well to leave that part of the inner wall of the ethmoid which housed the olfactory nerve filaments. This was done rather to preserve the sense of smell than to obviate the development of meningitis via the cut filaments. Silver tampons as an after-treatment were admirable.

Treatment of Hyperplastic Ethmoiditis.—Localised hyperplasia (polypi) was treated with a snare, and it was strongly advisable to resect the bony attachment of the polyp. In generalised hyperplasia of the anterior and posterior labyrinths, complete removal, as far as possible, of the degenerated tissue was called for. Here the Mosher and Sluder operations were indicated. Intranasal operations demanded an intimate knowledge of anatomy, but even so there was no anatomical configuration of the ethmoid cells to constitute a normal model. In consequence of these variations, certain deep-lying cells often escaped attention, and that was why the ultimate results were not all good. Nevertheless, he was convinced that the intranasal operation offered the least dangerous, if not the most facile, opportunity to the patient for relieving him of his distressing and ofttimes dangerous infection.

Mr. W. G. HOWARTH (London) classified chronic ethmoiditis into catarrhal and suppurative varieties. He was of opinion that the catarrhal type in its early stages might respond to treatment by simple lavage and hygienic measures, but these were of little use if there was deep infection. He emphasised the importance of aeration and drainage and strongly advised the removal of the middle turbinate. The suppurative variety might be treated by morcellement of the cells after preliminary removal of the turbinate, but he thought the labyrinth could not thoroughly be cleared out by an intranasal operation. He preferred to approach it via the extranasal route, which he had used for 15 years. It gave a better approach to the ethmoid and was not dangerous. Even this method, however, did not expose all the ethmoid cells in certain cases.

The PRESIDENT (Dr. D. R. Paterson, Cardiff) made a plea for conservative treatment. He mentioned cases in which, for various reasons, radical measures had not been attempted. These cases had been treated along conservative lines, such as the periodic removal of polypi for many years. Looking back on these cases he had no reason to be dissatisfied with the results.

Mr. E. B. WAGGETT (London) thought that antritis usually coexisted with ethmoiditis, and that failure to cure the antral trouble was due, in many cases, to an infected bulla. Snipping off the bulla was always worth while.

Mr. HERBERT TILLEY (London) stressed the importance of the use of the endoscope as a means of diagnosis. The antra should be explored in every case of chronic catarrh. He thought there were cases of

ethmoiditis in which neither suppuration nor polypoid formation occurred.

Dr. WILLIAM HILL (London) spoke of the difficulty of complete exenteration of the labyrinth, and pointed out the difficulty of dealing with cells extending into the wings of the sphenoid. He did not advocate the routine use of multiple exploration punctures.

Dr. P. WATSON-WILLIAMS (Bristol) said that while the suppurative and non-suppurative varieties were clinical entities, they were but expressions of the same pathological process. The variations depended upon the virulence of the infecting organisms and the patient's own resistance. He suggested the use of vaccines on tampons, and to this end specimens of pus should be obtained by means of suitable cannulæ. With regard to operative measures, he favoured intranasal methods. The middle turbinate should be conserved as far as possible. It at least served as a guide for the removal of the ethmoid cells.

Mr. W. S. SYME (Glasgow) believed that ethmoidal disease was often more extensive than it at first sight appeared. Exploration of the antra was essential, and in most cases an intranasal operation sufficed.

Mr. C. A. SCOTT RIDOUT (Portsmouth) advocated the external nasal operation. He pointed out the frequency of pain between the eyes in infection of the posterior ethmoid cells.

Mr. J. B. HORGAN (Cork) believed in mutiple explorations, and recommended approach to the ethmoid cells via the antrum. He had found iodised phenol of service in cases where the capsule of the ethmoid had been broken into during operations.

Dr. G. M. COATES (Philadelphia) referred to the use of vaccines in chronic infection. American practice did not place any great reliance on their virtues.

Dr. LOGAN TURNER (Edinburgh) expressed the opinion that the external operation was based on sound surgical principles. While meningitis resulting from infection conveyed along the olfactory nerve filaments could not be very common, it did undoubtedly occur. Specimens illustrating it could be seen in the Edinburgh Museum.

Dr. SKILLERN, in reply to a question, stated his preference for local anæsthesia.

Dr. WATSON-WILLIAMS read a paper on a case of Optic Neuritis due to Sphenoidal Sinusitis, which was treated by differential exploration. He pointed out that anatomical variations of the sinuses frequently made diagnosis difficult. In his case the patient had a true undeveloped left sphenoidal sinus. This had become infected and the patient had developed optic neuritis. The infected sinus was found by a process of differential diagnosis, in which cannulæ were used. The method of use was demonstrated by lantern slides. He mentioned that the patient's optic neuritis had much improved when he was subsequently examined by Dr. D. Leighton Davies.

DRAINAGE OF BRAIN ABSCESS.

Sir PERCY SARGENT, in opening the discussion, referred to the special features of brain abscesses. These were the type of tissue involved, the presence of cerebro-spinal fluid, and the pressure conditions within the cranial cavity. There was also the frequent coexistence of other conditions to be considered—e.g., meningitis, ventricular ependymitis, and sinus phlebitis. Four types of abscesses could be recognised: (1) diffuse septic softening; (2) a pus-containing cavity with a ragged wall; (3) a cavity with a thin capsule of young fibrous tissue; (4) a cavity contained by dense fibrous tissue perhaps an inch in thickness.

In the first variety, which was really not an abscess at all, no surgical treatment was likely to be of any use, save perhaps simple decompression. In the second class drainage might be successful. The third and fourth types differing only in the thickness of the capsule, merged imperceptibly into one another. Around the thin-walled abscess there was an area of œdematous brain along which extension might take place and by which route the ventricle might become involved. In the thick-walled abscess the changes in the surrounding brain were insignificant. Their proper treatment was complete enucleation followed by closure of the wound without drainage.

The commonest type of abscess was probably that represented by Type 3. Most of these were of otitic origin and situated in the temporal lobe or cerebellum. Cerebellar cases, because they usually gave earlier indications of their presence, were more likely to be operated upon at an earlier stage. He commented upon Macewen's series of cases and his astonishingly low mortality-rate. This latter, he thought, was due to the fact that Macewen's cases consisted of definitely encapsulated abscesses with a long history. These cases did not lend any support for early operation, but in the speaker's opinion early operation ought to be undertaken as soon as an abscess was diagnosed. The dangers of delay were: rupture into the ventricle, acute spreading œdema, and, especially in cerebellar abscess, sudden respiratory failure.

If an abscess were imperfectly drained, the ventricle which contained fluid under pressure might rupture into the abscess and lead to the escape of cerebro-spinal fluid from the wound. If properly drained, the intracranial pressure fell. The appearance of a fungus cerebri—i.e., a protruding mass of strangulated necrotic tissue—was indicative of unrelieved pressure. The route of approach and the method of drainage were of prime importance. The "stalk" of the abscess, representing the inward track of infection, was the ideal route of approach. In otitic cases during a mastoid operation the "stalk" might fortunately be found, and it was possible that the drainage thereby established might be adequate.

Failing the finding of the "stalk" a transarachnoid route must be used. After the skull had been opened the subarachnoid space should be packed off with gauze before the pus was evacuated. This guarding plug might be left in for two or three days.

A subcortical abscess was usually indicated by bulging of the brain with pallor and broadening of the convolutions. These appearances were lacking in deep-seated abscess, and exploration with the trocar and cannula was to be deprecated. He was accustomed to use a small flat seeker, with which the resistance of an abscess wall could be felt. Having located the abscess he tied off all necessary cortical vessels, and then he incised the abscess with a knife. The material of the drainage-tube was of little importance provided it was sufficiently rigid. He had used aluminium and celluloid tubes. The tube should be sutured to the dura or skin and kept clean by syringing. It should be shortened very gradually, and there was always a tendency for some œdema to push it out. This could be tided over by lumbar puncture.

Mr. SYDNEY R. SCOTT (London) spoke of the routes of infection in brain abscesses of otogenic origin. A cerebral abscess might develop via the tegmental, the labyrinthine, or the venous route, and cerebellar abscesses originated from the antrum, the sigmoid sinus, or the labyrinth. Regarding methods of opening the skull, he preferred the use of a broad sharp gouge and a heavy hammer. The gouge should be used parallel to the surface. He deprecated the use of blunt probes in the case of acute abscess. A short pointed knife was advisable. If thick pus was present a dilating forceps was useful. For enucleation purposes he used a spoon and forceps. Drainage was not always necessary as in the case of a small superficial abscess. He said that the use of a suction apparatus was sometimes desirable, but demanded great care. In concluding, he spoke of the value of manometric records as an aid in controlling pressure.

Dr. E. D. D. DAVIES (Stonehouse) pointed out that drains might sometimes be harmful. They might be a source of trauma or secondary infection.

Mr. E. B. WAGGETT (London) suggested exploration with the finger. Once the abscess had been located by an instrument, the latter should not be removed until the drain had been inserted.

Dr. WILLIAM HILL asked why the prognosis of frontal abscess was so bad compared with that of temporo-sphenoidal abscess.

Mr. HUGH E. JONES (Liverpool) thought that possibly the close relationship of the anterior horn of the ventricle to a frontal abscess was the explanation. He raised the question of ventricular drainage, where drainage of the abscess was not enough.

Mr. T. R. RODGER (Hull) suggested that it might be advisable to delay operation on a cerebral abscess so as to permit of encapsulation.

Dr. COATES (Philadelphia) said that the mortality-rates in his country were approximately equal to those in this. He disliked rapid drainage.

Sir PERCY SARGENT, in reply, spoke of the size of the cranial opening. It should always be of sufficient size, a mere trephine opening was not sufficient. A contralateral decompression was of use for the relief of pressure. Ventricular puncture, while useful, was transient in its effects. Hypertonic saline injections were efficacious, but their effects should be carefully watched, for there was a danger of the brain falling away and thereby opening up adhesions. He had no experience of a two-stage operation, nor of gauze drainage, and the latter might be harmful.

INJURIES OF THE EAR ARISING FROM FRACTURE OF THE SKULL.

Dr. E. D. D. DAVIES remarked that in view of the increasing frequency of motor and street accidents, the aurist's point of view was of particular importance. The aurist was usually called in some weeks after the accident to treat deafness, or in connexion with compensation matters. He would be able to give a more accurate estimation of the damage, and treatment might be facilitated, if he were called in soon after the occurrence. Most fractures of the base involved the middle fossa, and this was to be expected, since a line of weakness extended through both Glaserian fissures and the Eustachian tubes to the foramina lacera media, between which was the sphenoidal sinus. The halves of the skull were more or less cemented together by the basi-occipital and the basi-sphenoid, and the fracture usually followed this weak line. The roof of the tensor tympani canal and Eustachian tube and that of the tympanum and antrum were usually involved in fractures along this line.

The extent of the injury varied with the violence, and the site where the blow was applied. Spicules of bone from the tegmen were sometimes found in the auditory meatus. The middle ear was almost always damaged in surviving cases, while the internal ear was rarely fractured. The external meatus was often fractured when the line was through the Glaserian fissure. It appeared to split longitudinally into an upper and lower half. (A specimen showing this was exhibited.) A crack in the roof of the meatus was more common. Where great force was applied, the fracture might extend from the upper or anterior surface of the petrous bone into the internal meatus. A smashing blow might knock off the mastoid and injure the lateral sinus. Fractures of the posterior fossa began in the cerebellar fossa, radiated into the sinus groove of the same side, and then passed either along the inferior petrosal sinus groove or across the petrous pyramid, through the cancellous bone surrounding the antrum and semicircular canals and behind and external to the internal meatus. A blow on the temporal fossa had cracked the roof of the middle ear, and blood had escaped into the tympanum without rupturing the drum. No blood was found in the meatus, but the drum had a bluish appearance. In four such cases the only indication was deafness, and the injury would not have been detected without an aural examination. In such cases posterior rhinoscopy would occasionally show blood in the orifice of the Eustachian tube. Hearing was completely recovered in these four cases in three weeks. Usually, however, the upper half of the drum was ruptured, and blood escaped into the auditory meatus. Leaking of cerebro-spinal fluid indicated the opening-up of the subarachnoid space, and all such cases he had seen had been fatal. Cerebro-spinal fluid also escaped in fractures involving the internal ear.

Profuse and prolonged bleeding from the ear pointed to rupture of the middle meningeal artery or the lateral sinus, and urgent operation was called for. The meatus was sometimes a vent for extradural hæmorrhage and ought never to be firmly plugged. The lateral sinus was rarely ruptured, and the increased intracranial pressure sufficed to arrest bleeding. Hæmorrhage from both ears had a mortality of 66 per cent., while from one ear it was 39 per cent. The average mortality of all cases of fractured base was about 40 per cent.

The presence of pre-existing middle-ear suppuration made meningeal infection very probable. Local suppuration sometimes followed the injury, and materially added to the damage. Mastoid suppuration occasionally followed a fracture, and was liable to lead to meningitis. Some cases of local suppuration, if seen late, could not be distinguished from ordinary chronic middle-ear suppuration, hence the importance of examination soon after the accident. In compensation cases the history of absence of deafness and ear disease previous to the injury should be carefully verified.

Facial paralysis occurred in abour 46 per cent. of fractures of the middle fossa. In a few cases the eighth nerve was involved as well. The facial nerve was injured in the facial canal, particularly near the geniculate ganglion. Paralysis set in almost immediately, save in some cases where it was due to hæmorrhage into the canal. Recovery in these latter cases was more rapid. All cases he had seen had recovered, even after long intervals.

The degree of deafness arising from fractures was very variable. Some showed no deafness. A case seen 12 months after injury, in which the sixth, the seventh, and part of the third nerve had been paralysed, revealed only slight middle-ear deafness. Suppurative cases suffered most loss of hearing, and this loss became permanent. Any improvement which occurred usually took place within eight weeks of the injury. He had not seen genuine ear deafness arising from concussion alone, or from a fracture showing the signs he had described. Probably all subjects of injury to the internal ear died.

The treatment was not always masterly inactivity, and a watch should be kept for the onset of suppuration. Absolute rest in bed for a long period was essential, and the less done to the ear the better. The head should be raised. The meatus should be gently cleansed with spirit, and sterile wool frequently changed should be placed lightly in the orifice. If there was a discharge of cerebro-spinal fluid, the skin should be dried and smeared with antiseptic ointment. Packing with gauze, syringing, and the use of drops were to be deprecated. If suppuration arose, free drainage should be established. The drum should be incised if necessary, and a simple mastoid operation should be carried out at the slightest indication. The operation should be done gently, and preferably by burr or drill to avoid the jarring of the mallet and chisel. Early recognition and treatment of suppuration were essential, to prevent meningeal or intracranial infection.

SECTION OF HISTORY OF MEDICINE.

NATURE AND TREATMENT OF DROPSY.

Mr. WALTER G. SPENCER presiding, Dr. J. D. COMRIE (Edinburgh) discussed the historical aspect of ideas regarding the nature and treatment of dropsy. From the earliest times, he said, dropsy was recognised as a morbid condition and was for long regarded as a disease sui generis due to liquefaction of the tissues. The ancient Greek physicians attributed it chiefly to a disorder of the liver, and hardening of the organ was regarded as the principal cause by the Alexandrian school of medicine. Galen regarded the defective action of the heart which was

often an accompaniment of dropsy as an effect rather than a cause. In the eighteenth century Morgagni drew attention to the frequency with which the heart was found to show valvular defects and other disorders in cases of dropsy, but did not carry the matter further. Withering, who introduced the use of digitalis in 1775, recognised that only certain cases of dropsy were amenable to treatment by the drug. He described as the type of case in which the dropsy was chiefly benefited persons showing symptoms which were now recognisable as being those of advanced cardiac disease, although the means of diagnosing valvular disorder were not at the time available to Withering. In the beginning of the nineteenth century Corvisart followed by Laënnec placed the diagnosis of cardiac disease on a sure foundation and showed that dropsy was frequently simply a sequel of this type of disease. The recognition of kidney disease as a cause of dropsy was first made early in the nineteenth century when Wells, Blackall, and others pointed out the fact that the presence of albumin in the urine was a prominent feature in certain dropsical cases, and these observations were placed on a sure footing by Bright in 1827. A further group of cases in which neither the heart nor the kidney was found to be at fault was demonstrated by Gull and Ord in the seventies of last century to be due to atrophy of the thyroid gland and to be of a different nature from simple watery œdema.

The PRESIDENT dealt with the surgical aspects of dropsy, particularly omentopexy.—Prof. J. A. NIXON sketched the history of war œdema or famine œdema, the first reference to which was to be found in Hesiod's "Works and Days."

WELSH PHYSICIANS AND THE RENAISSANCE.

Dr. E. ROLAND WILLIAMS (Maenchochog) gave an account of those Welsh physicians of the sixteenth century who had claims to be remembered not only as physicians but also as pioneers of the new learning in other fields of knowledge. The earliest and greatest of these was Robert Recorde, of Tenby (1510–58), who was not only a physician of repute but also one of the great mathematicians of the sixteenth century. To him was due the invention of the sign of equality (=) and the popularisation of the signs plus (+) and minus (−). He was the author of a treatise on anatomy and of "The Urinal of Physick," which laid down the classical canon of uroscopy. Humphrey Llwyd, of Denbigh (1527–68), was another physician notable for the breadth of his culture and his pioneer work in new fields of knowledge. He was the author of "The Judgment of Urine," published posthumously in 1553, which was a kind of therapeutic index and guide to dispensing. Llwyd was devoted to music and was an industrious and erudite writer on Welsh history and antiquities, but his work on geography formed his chief contribution to the new learning. Many prints of his maps were still extant. One of the early translators of the classics into English was the physician, Thomas Phaer, who rendered nine books of the Æneid into English verse and was also the author of two medical works, "A Goodly Brief Treatise of the Pestilence" and the "Regimen of Health." Several of the contemporary Welsh grammarians were physicians who sought relaxations from the cares of practice in what one of them called "the anatomy of language." The most picturesque, typical, and learned of these was John Daffyd Rhys, of Llanfaethlu, in Anglesey, who graduated as doctor of physic at Sienna and wrote two grammatical treatises in Italian, one being an "Introduction to the Study of Latin" and the other a "Guide to the Pronunciation of Italian." He subsequently returned to Wales and practised in Brecknockshire where he died in 1609. During the last period of his life he wrote a Latin treatise on Welsh grammar and prosody, and published a Welsh translation of Aristotle's metaphysics.

Dr. J. D. ROLLESTON (London) emphasised the importance of Thomas Phaer whom Prof. J. Ruhräh had called "the father of British pædiatrics."

HISTORY OF SCARLET FEVER.

Dr. Rolleston said that not only in the remote past but until comparatively recent times it was often almost impossible to disentangle the history of scarlet fever from that of other acute exanthemata, especially measles and erysipelas on the one hand, and diphtheria on the other. An attempt had been made by some writers to trace back the history of scarlet fever to classical antiquity and even to identify it with the pestilence at Athens in 430 B.C. Some passages in Hippocrates had given rise to the belief that the father of medicine was familiar with scarlet fever, as he described an illness accompanied by a severe sore-throat though he made no mention of a rash. The mere existence of ulcers on the tonsils, however, did not justify the diagnosis of non-eruptive scarlet fever. The same objection applied to passages in Celsus, Caelius Aurelianus, Aretæus of Cappadocia, and Aetius of Amida supposed to refer to scarlet fever, whereas diphtheria was probably the disease in question.

The Arabian physicians such as Avicenna, Ali Abbas, and Rhazes had also been credited with allusions to scarlet fever, but their descriptions were too vague to be interpreted as such. The first undoubted reference to scarlet fever in medical literature was made by Ingrassias (1510–80), who, in a work published at Naples in 1553, described a disease popularly known as Rossalia, or Rosania, which he distinguished from measles. The next most important writer on scarlet fever was Baillou (Ballonius) who, under the title of Rubiolae, described the principal varieties of the disease from his observations on a severe epidemic in Paris in the winter of 1574–75. Jean Cottyar, of Poitiers, a contemporary of Baillou, also gave an account of the disease under the name of "febris purpura epidemialis et contagiosa." A much more important writer was Daniel Sennert (1572–1637), who was the first to describe scarlatinal desquamation, the early arthritis, and post-scarlatinal dropsy and ascites. The epidemic which he observed at Wittenburg was severe and often fatal, and convalescence was protracted. Sennert's son-in-law, Michael Doering, observed an epidemic in Poland in 1625 and also noted the desquamation, rheumatoid pain, and anasarca as well as the inflammation of the tonsils and surrounding parts.

The term scarlatina was generally supposed to have been first introduced into medical literature by Sydenham, who published his brief account of the disease in 1683, six years before his death. The mild character of scarlet fever at that time was shown not only by his statement that it was hardly worthy the name of a disease, but also by his omitting any mention of the sore-throat or of the complications of rheumatism and dropsy described by his predecessors. In spite of his inadequate description, Sydenham was to be credited with having established the autonomy of the disease and given it a name to distinguish it from the other acute exanthemata, especially measles. His contemporary, Richard Morton, however, maintained that scarlet fever and measles were exactly the same, although unlike Sydenham he described a malignant as well as a mild form and expressly mentioned inflammation of the fauces in the acute stage and alluded to dropsy and ascites as sequelæ. He was also the first writer to mention the occurrence of scarlatinal otitis. In spite of Morton, Sydenham's distinction of scarlet fever from measles was accepted by subsequent writers.

The occurrence of scarlet fever in Scotland was first described by Sir Robert Sibbald, physician to Charles II. and President of the Royal College of Physicians of Edinburgh, in his work "Scotia Illustrata," published in 1684. During the eighteenth century numerous epidemics occurred throughout Europe and the United States and were described by Huxham, Fothergill, and Withering in England, Storch and Zimmermann in Germany, Plenciz in Austria, De Haen in Holland, Rosen von Rosenstein in Sweden, Tissot in Switzerland, and Benjamin

Rush in the United States, where the disease first appeared in 1735. During the eighteenth century there was a tendency to confuse scarlet fever with angina maligna, which was not finally established as a distinct disease until 1821 when Bretonneau gave it the name of "diphthérite." During the last 30 years of the eighteenth century there was a considerable increase in the incidence of scarlet fever, epidemics of which occurred in England, France, Germany, Italy, Holland, Sweden, Denmark, and North America. The epidemics were mostly mild, but one in central Germany, which lasted from 1795 to 1805, was attended by an unusually high mortality.

At the commencement of the nineteenth century malignant and extensive epidemics were followed by periods of lesser prevalence and low mortality, as shown by the experience of Graves in Dublin and Bretonneau in Tours, who differentiated scarlatinal angina from diphtheria. His doctrines were developed by Trousseau, who drew attention to the characteristic tachycardia and frequent occurrence of miliaria, and gave an account of the "formes frustes" (defaced types) of the disease. In the course of the nineteenth century several parts of the world which had hitherto escaped received their first visitation of the disease, such as Madeira (1806), South America (1829), Greenland (1847), Australia and New Zealand (1848), and California (1849). The mortality from scarlet fever in England was very high for at least 50 years after the introduction of registration in 1838, the maximum being reached in 1863. During the last 50 years the mortality had shown a steady decline in England in striking contrast with that in Eastern Europe, especially Poland, Bulgaria, and Roumania.

In conclusion Dr. Rolleston alluded to the advances in our knowledge of the ætiology, prophylaxis, and treatment of scarlet fever since the war.

Welsh Physicians in the Middle Ages.

Dr. P. Diverres (Swansea) said that the first medical treatise in Welsh known as the Meddygon Myddfai (the physicians of Myddfai) was probably composed in the thirteenth century. The compiler did not make use of folk medicine, but borrowed freely from Latin authors of repute in that line and in particular from the Secretum Secretorum. With the exception of the Welsh Laws references to physicians were very scanty in mediæval Welsh literature. There were, he said, no allusions to a school of medicine such as existed in the Middle Ages on the continent, but he believed that each physician trained some pupils who were often, perhaps in most cases, his sons or near relations. It was noteworthy that Gerald, the Welshman whose work was so full of interesting details, made no mention of physicians—an omission not likely to have occurred if medical practitioners had been numerous in his time. The Welsh Laws, which in their present state dated from the thirteenth century, only mentioned the Court Physician who was one of the 24 officers of the Court. He was one of the three persons allowed to have private intercourse with the King without the presence of the judge of the palace. He was never allowed to leave the palace without the King's permission. He was expected to give his professional attendance gratuitously to all the officers of the palace, receiving only by way of fees the blood-stained clothes of the patient. If, however, he had to attend to one of the three deadly wounds (blow on the head penetrating the brain, stab in the body penetrating the intestines, and fracture of one of the four limbs) he was to receive one pound without his food or nine score pence with his victuals. In war time the Court Physician was obliged to accompany the armies. According to contemporary medical texts most diseases were treated with remedies made of herbs, but in some cases other kinds of treatment were known such as ligatures, cauteries, and baths.

History and Lore of Cinchona.

Mr. C. J. S. Thompson (London) discussed the history of cinchona during the past 300 years from the traditional, the empirical, and the chemical aspects. He dismissed as unfounded the stories told by Geoffroy and La Condamine of the discovery of the febrifuge properties of cinchona by natives. The first authenticated record of the therapeutic value of cinchona bark was in 1638, when the wife of the fourth Count of Cinchon and Viceroy of Peru contracted intermittent fever and made a rapid and complete recovery after taking powdered bark which had been sent her by the Corregidor of Loxa who had himself been cured of an attack by this drug. When the Countess returned to Spain in 1640 she took with her a quantity of bark which she distributed among those suffering from fever on her husband's estates. In 1653 Chifflet, physician to the Archduke Leopold of Austria, wrote a report on the drug and its introduction into Europe. Contemporary physicians differed as to its value. Although many admitted that it palliated the fever, they insisted that it "fixed the humour," thus causing a relapse of some other dangerous disease. It was known at the time as *pulvis Jesuiticus* because the Jesuit fathers used to administer it, or more commonly as *pulvis Peruanus*. In 1670 the Jesuit fathers in Peru sent considerable supplies to Rome, where the methods for using it were explained to a congress of Jesuits. The bark was first known in England in 1655. Brady, then professor of physic at Cambridge, was one of the first to prescribe it, but its general introduction was largely due to Robert Talbor, who made his name and fortune by exploiting it as a secret remedy. In 1677 Peruvian bark first appeared officially in the London Pharmacopœia under the name of Cortex Peruanus. Until the beginning of the nineteenth century cinchona was still used in the crude state, and it was not until 1810 that Gomez, of Lisbon, obtained the acute principles of cinchona, the basic properties of which he called "cinchonino." In 1820 Pelletier and Caventou showed that cinchonino consisted of two distinct alkaloids, one of which they called quinine and the other cinchonine. In 1833 Henry and Delandre isolated quinidine, in 1844 Winckler discovered cinchonidine, and Pasteur produced the alkaloidal derivatives, cinchonicine and quinicine. Since the discovery of quinine 30 alkaloids have been found to occur naturally in cinchona bark, and from these there had been many derivatives.

SECTION OF TROPICAL MEDICINE.

Human Helminthiasis.

Dr. P. H. Manson-Bahr presiding, Lieut.-Colonel Clayton Lane read a paper on recent advances in the diagnosis and treatment of human helminthiasis. He dealt with the various fæcal egg-counting methods which, for estimating the output of helminth eggs, dated from 1885, and for the control of diagnostic techniques and the estimation of the extent and degree of individual infection in a community from 1918. The means used, he said, should fit the end in view; the diagnostic technique of direct centrifugal floatation (D.C.F.) could detect the presence of a single female hookworm normally ovipositing, was the only technique capable of mass usage, and was the simplest, most rapid, and most accurate available for hookworm, and probably for other common nematode infections where eggs appear in a host's fæces. It fulfilled an aim he had set before himself over ten years ago and since steadily pursued. Diagnosis by culture and extraction of hookworm larvæ was untrustworthy and might well miss the most active, and therefore most dangerous, larvæ. Trapped cultures must be used. "Creeping eruption" probably indicated intradermal wandering of a larva in an uncongenial host.

The principle of the Casoni skin sensitisation reaction for hydatid had, said Dr. Lane, been applied by Fülleborn to strongyloides infection, where it was invariably positive if the infection had lasted more than 18 months. Positive reactions with ascaris antigen appeared to be independent of ascaris

infection. Hamilton Fairley had shown that complement deviation had marked value as a test for hydatid and schistosome infections. In appraising the damage done by infection arbitrary selection of tests was worthless. Tests must be such as really measured any disability produced. The most promising and controllable were those which dealt with the same persons before and after disinfestation, and there was reassuring evidence that such tests, dealing with general mortality, morbidity, and wage-earning capacity, were coming into their own again.

In treatment the perfect anthelminthic was yet to seek. The value of intravenous emetine and tartar emetic in schistosomiasis was established; yet Hamilton Fairley had shown that they were not parasiticidal in themselves, but were changed in the body into something which was; similarly, santonin appeared not to be toxic to ascaris, but to become so under the action of bile. Allusion was made to the persisting and lethal error which confused Schüffner's advocated dosage for oil of chenopodium of 48 drops from the international dropper, or 1·2 c.cm., with 48 minims or 3 c.cm. As to carbon tetrachloride, the drug with "no lethal dose," which was claimed to cause, in every million, but a few deaths, "and those among the ones who could best be spared," it was pointed out that, while 3 c.cm. was the advocated dose, death had followed 1·5 c.cm. of the pure drug, and sometimes many deaths. The precautions now advocated as possibly effective in preventing these deaths precluded the employment of the drug on a mass scale.

Dr. Lane drew a sharp contrast between mass treatment, which implied previous individual diagnosis, and herd treatment which "drenched" men promiscuously like cattle, and it was urged that since D.C.F. permitted four men to make an individual diagnosis regarding hookworm infection at the rate of a quarter of a million specimens or more yearly, herd treatment had no justification in morality, science, or expediency. If for the purposes of herd treatment there were adopted a drug, unforeseeably deadly in less than the advocated dosage, the advocated precautions against whose lethalness were inapplicable in herd conditions, then such adoption must in future imply disregard of professional obligations to those treated and deliberate pursuance of a course devoid alike of reason and humanity.

Discussion.

The PRESIDENT said he had found in the long-needed accuracy of diagnosis now afforded by D.C.F. a valuable clinical advance, for his clinical experience was positive that no infection with ankylostomes, however small, should be neglected on its own account or as an important because] harmful complication in other diseases. In his own hands, under conditions obtaining in hospital in England, carbon tetrachloride had proved a safe and effective drug in scores of cases of hookworm infection. There was, however, great need of standardisation of anthelminthics.

Prof. E. HINDLE had noted, as a result of periodical examination of fæces of unselected patients in Cairo, that many got rid naturally of their hookworm infestation without any treatment. Prevention of reinfection was therefore of chief importance.

Dr. C. M. WENYON thought that the main objection to herd treatment without diagnosis appeared to lie in the unforeseeable lethalness of one of the drugs used. Discovery of a safer, yet effective, anthelminthic would remove that objection.

Dr. B. M. WILSON described the anti-hookworm campaign in Jamaica. There a sanitary unit dealing with village sanitation in general and latrines in particular took charge of the selected area, and after their work was well established the treatment unit began theirs. This plan was based on the fact that treatment was largely wasted unless reinfection could be prevented. Deaths after carbon tetrachloride had occurred in Jamaica, and there thymol was now the drug of choice—an effective one—against hookworms.

Dr. H. M. HANSCHELL recounted his experience of the success of D.C.F. in revealing very small ankylostome infections where other not more time- or labour-saving technique had failed to do so. In certain of his cases of secondary syphilis proving unexpectedly resistant to treatment discovery by D.C.F. and expulsion by thymol of the small number of hookworms present had been followed by rapid clinical and serological response to the same anti-syphilitic treatment. Carbon tetrachloride was a proved potent liver poison. It should not, therefore, be given to a purged and fasting patient unless sufficient glucose were given at the same time. For the same reason, to protect the liver, glucose should be given with antimony drugs also.

Dr. J. B. CHRISTOPHERSON held that antimony acted directly on the schistosome, though possibly not as antimony tartrate, but perhaps in an organic combination. There was no evidence that action of the drug on body tissues produced an "antibody."

Dr. Manson-Bahr read a communication from Dr. F. G. CAWSTON, of Natal, reporting success in treating "creeping eruption" with intramuscular colloidal antimony, or intravenous tartar emetic injections, and also with carbon tetrachloride by mouth in human schistosomiasis and in distoma infestation of cattle.

TRANSMISSION OF KALA-AZAR.

Dr. C. M. WENYON began by pointing out that development of kala-azar and oriental sore parasites into *leptomonas* forms was strong evidence for an insect host. *Leptomonas* were essentially intestinal parasites of insects or other invertebrates. The flea had such an infection, which spread from flea to flea as small rounded bodies, resembling *leishmania* of kala-azar and oriental sore. They escaped in the flea's fæces, were ingested by flea larvæ, and appeared as *leptomonas* in the hind gut of adult flea. All insect *leptomonas* had that simple life-history. A sand fly which ingested parasites of kala-azar, or oriental sore, acquired *leptomonas* infection, but in stomach, œsophagus, and even buccal cavity, not in hind gut. If such sand fly fed through a membrane into a fluid it injected the *leptomonas*, it must therefore inject these also into wound it inflicted in skin. That no one had actually transmitted kala-azar, or oriental sore, by its bite was not due to lack of infectivity, for if the flagellates were removed by dissection from sand fly and injected into man's skin (oriental sore), or into hamster's peritoneum, a kala-azar infection occurred. Perhaps "receptive" condition was necessary to ensure infection from small dose injected through proboscis. *Leishmania* parasites would develop in the bed bug, but that could not be host for distribution of bug and disease differed, and if few *leishmania* were ingested by bug only few flagellates developed. In the natural host there was progressive increase of flagellates which attached themselves to cells of the intestine. No attachment occurred in bug. Association of canine with human kala-azar in Mediterranean region gave rise to theory of flea transmission, but careful experiments had failed to incriminate that insect. Kala-azar parasites in intestinal villi of man indicated possible escape in fæces, and they had been demonstrated in the urine. Contamination infection was unlikely for the parasites could not withstand drying and would not survive in water. Ankylostomes were possible ingestors of the parasites, but these helminths from cases of kala-azar had not revealed trace of infection. In the sand fly from small dose of *leishmania* there developed large numbers of flagellates attached to cells of stomach and persisting for life of fly; thus the parasite behaved as in a natural insect host. Probably site of infection, originally in hind gut, had changed; or perhaps sand fly was not original insect host. Man having become infected from original insect host, which might or might not now function, the sand fly might have become secondarily infected from man. A similar problem was presented by tsetse fly transmitted trypanosomes, where development in tsetse was also an anterior one. It was a posterior one in the primitive *Trypanosoma lewisi* in the flea. This spread from flea to rat by the latter's

ingesting flea fæces containing infective trypanosomes. If the sand fly were the vector there were several possible modes of infection of man. Flagellates might be occasionally ejected from the fly's rectum on to the skin, but dose deposited would be even smaller than that injected from probocis. Crushing of sand fly gave larger dose which might be inoculable by scratching or by conveyance on fingers to mouth or conjunctiva.

In India the distribution of kala-azar corresponded with that of the sand fly *Phlebotomus argentipes*. In China the disease was found only north of the Yangtse. There was no information regarding existence of sand flies south of it. In India *argentipes* was most suspected, though development occurred also in *papatasii*. In North China *P. major* var. *chinensis* and *P. sergenti* var. became infected, but former was the better host. With oriental sore, *P. papatasii* in Palestine and Biskra had been infected, and in Bagdad *P. sergenti*. In Palestine and Biskra *P. papatasii* had been found infected in natives. In India a single infected *P. argentipes* had been captured in a kala-azar house. With South American cutaneous leishmaniasis a single experiment suggested that *P. intermedias* might be the vector. There were infections of animals—e.g., gecko and chameleon—and plants, with *leptomonas*, but nothing was known as to the relations these might have to the human diseases. At present, therefore, transmission problem of kala-azar and oriental sore centred around sand flies. The extraordinary flagellate development of *leishmania* parasites in them was convincing evidence that they were the vectors.

Discussion.

Prof. HINDLE gave an account of recent work supporting the view that sand flies were mainly responsible for the transmission of *leishmania*. He pointed out: (1) The *specific nature of the development in the sand fly*. The sand fly stomach did not serve merely as a favourable culture tube, for, if so, different strains of *leishmania* should develop equally well in any one species of phlebotomus. Yet, though four different strains of *leishmania* all developed into flagellate stage in the Chinese sand fly *P. major* var. *chinensis*, only the local strain of *leishmania* showed attachment of flagellates to stomach wall, and subsequent incursion of pharynx and buccal cavity. This presence of flagellates in anterior gut occurred only in the species of sand fly and with the particular strain of *leishmania* that seemed to be transmitted by it. (2) The *virulence of the flagellates in the sand fly*, proved by inoculation of contents of infected flies into susceptible hosts. As corollary, since these flagellates were present in the infected fly's proboscis and must therefore be inoculated into skin when that fly fed, that fly's bites would sooner or later produce infection. (3) The *geographical evidence*. In both India and China there was close agreement between distribution of kala-azar and that of sand fly presumably responsible for transmission of the disease. He criticised the transmission experiments up to date, and showed that with kala-azar they were inadequate in number to prove or disprove infectivity of the sand fly. In China kala-azar occurred in infants who, by reason of age, could not have been exposed to sand fly bites. Low and Cooke's case of kala-azar in an infant born in England, whose mother had contracted kala-azar in India, demonstrated that the disease might be congenitally acquired. The infant cases in China were doubtless of that kind. Referring to possibility of a second insect host in the cases of *leishmania* and *trypanosoma* in which flagellate stage occurred only in anterior gut of insect vector, here the parasite had merely lost hind gut flagellate stage in becoming closer adapted for life in the vertebrate host. Suppression of development in insect host reached its limit in the disease "dourine," where the trypanosome had become a parasite of the vertebrate host only, and transmission was only by direct contact in coitus.

Colonel A. G. MCKENDRICK quoted results of his statistical inquiry in support of the theory of sand fly transmission of kala-azar.

Sir FRANK CONNOR described his cases in Bagdad and in India of familial and of multiple oriental sore. His clinical observations of these and other cases, their personal habits and circumstances, favoured the theory of the frequent occurrence of direct contact transmission of oriental sore.

Dr. CHRISTOPHERSON pointed out the profound biological difference between the morphologically indistinguishable parasites of trivial oriental sore and fatal kala-azar. Parasites of oriental sore experimentally inoculated into human beings always produced only oriental sore. Clinical evidence suggested that oriental sore was the result of skin infection with insect flagellate, and kala-azar resulted after the flagellate had been further pathogenically modified by additional developmental cycle in another host. His own experience of naso-oral and dermal leishmaniasis in Sudan showed that lesions could be the result of inoculation by insect, and also by direct contact infection.

Dr. MANSON-BAHR said he had observed oriental sore appearing in one parent in India, and six months after the family of four had returned to England the sore appearing in the other parent and the two children before the lesion in the first parent had healed. This suggested direct contact infection. He pointed out that to Dr. Wenyon we owed valuable and indispensable pioneer work on the transmission of oriental sore.

Correspondence.

"Audi alteram partem."

ACUTE DISSEMINATED ENCEPHALOMYELITIS.

To the Editor of THE LANCET.

SIR,—Attention should be directed to the frequency with which cases of acute disseminated encephalomyelitis are being encountered in certain parts of London. A number of cases more or less similar have been met with during the last few years in association with vaccination or with measles, but otherwise, until recently, they have been rare. In June last, however, Drs. Hunter and Brain[1] were able to report that they had seen six cases within a period of two months. In Germany and Austria such cases have been recorded in moderate numbers during the last two years, and there they seem to have occurred in circumscribed epidemics. Redlich[2] in March, 1927, reported that he had seen numerous cases in Austria; Pette[3] saw 25 at Hamburg in 1926, and the early part of 1927, Muntzka[4] in a paper just published records five cases at Dölling.

Now that these cases are occurring more commonly in London it is desirable that their clinical features should be made widely known in order that as many as possible of the cases may be recognised. The more severe of the cases which I have seen are characterised clinically by the facts that the symptoms are referable to widely separated, or, at any rate, discrete parts of the central nervous system, and, secondly, that they come on in a series of attacks, different parts of the cerebro-spinal axis becoming involved suddenly at different times.

The first case I saw was that of a man of 70 who was under the care of Dr. C. E. Sundell at the Seamen's Hospital in January of this year. His illness began with pains in both legs, and within a day or two the legs became weak and numb; subsequent examination showed that this paralysis was of the flaccid type. During the next week there was considerable recovery and then paralysis of the

[1] Hunter, D., and Brain, W. B.: THE LANCET, 1928, i., 1250.
[2] Redlich, E.: Wien. klin. Wochschr., 1927, xl., 344.
[3] Pette, H.: Münch. med. Wochshr., 1927, lxxiv., 1409.
[4] Muntzka, K.: Zeitschr. f. d. g. Neur. u. Psych., 1928, cxvi., 161.

hands came on abruptly in the course of a few hours; the extensor muscles in the forearms were as a whole more affected than the flexor, and in the right arm partial paralysis extended as high as the deltoid. Accompanying this paralysis was a sensory loss corresponding to the fifth and sixth cervical segments of the cord. These symptoms remained almost stationary for 14 days, and then acute bulbar symptoms came on and the patient died within a few hours from respiratory failure. In this case there was evidence of invasion at different times of three portions of the nervous system—lumbar enlargement, cervical enlargement, and medulla.

In the next case—a man of 32, admitted under the care of Dr. S. Wyard at the Bolingbroke Hospital on the last day of June—the patient had felt indefinitely ill for a few days and had severe headache; then he gradually lost the power of his legs in the course of four or five days, and the paralysis was accompanied by a feeling of numbness both in the legs and in the arms. During the next five or six days he was semi-conscious all the time. A fortnight after the beginning of the illness the left side of the face became paralysed, but it recovered rapidly after four days. In the limbs, at this stage, the tendon-jerks were all weak, the knee-jerks being unobtainable; the plantar reflexes were indefinitely extensor. The abdominal reflexes were absent. The patient complained for many days of severe pains in the arms. The cerebro-spinal fluid contained an excess of protein (0·10 per cent.) but no excess of cells. In the course of five or six weeks this patient made a complete recovery.

A third case was that of a man of 55, admitted under my care at the Bolingbroke Hospital on August 27th, 1928. He had not felt well for some months, and four days before admission on awakening in the morning he found that both his arms were weak and shaky. Within the next four days the hands became almost useless, and then recovered considerably. Two days after admission both hands had fair power, but they were still tremulous. By that time both sides of the face had become completely paralysed. The tendon-jerks were all brisk, and the plantar reflexes indefinite. There was no sensory loss. The patient was slightly delirious, but could be recalled to consciousness. He answered questions, but was very irritable. The cerebro-spinal fluid showed an excess of protein (0·085 per cent.), but no increase of cells. During the next 13 days his condition was almost stationary, but towards the end of that time his face showed great recovery. Then on Sept. 9th his temperature, which had hitherto been normal, rose to 100° F., and at the same time the patient began to have difficulty in swallowing and in talking. During the next 48 hours the temperature rose steadily to 102·4° F., and the paralysis of larynx and pharynx and tongue became absolute. The patient died from respiratory failure on Sept. 14th.

A fourth case was that of a little girl of 8 whom I saw at the National Hospital, Queen-square, on August 23rd. After a period of indefinite malaise she had suffered from pains in the lower limbs; then her legs became weak and she had difficulty in micturition, amounting almost to retention of urine. At that time she was considered to be suffering from poliomyelitis, but she had a high temperature. After three weeks the power of the legs had in great measure returned, but then the patient began to have difficulty in talking. (The precise nature of this difficulty cannot be determined.) She became very drowsy, and lay constantly with her head and eyes turned to the right. About the time of this aggravation her sight became dim. When admitted to the hospital she had extensor plantar responses on both sides, absent tendon-jerks in the right leg and arm, intention tremor in both hands, conjugate deviation of the eyes to the right, without any single ocular palsy, and partial atrophy of both optic discs. She is now recovering well, but it is too early to say how far recovery will go.

It is to be expected that in less severe cases of the same disease, the malady would not get beyond the stage of one more or less localised lesion, and most of the German cases have been of this type. Many of them presented the picture of a transverse myelitis of sudden onset and rapid recovery. Others at certain stages closely resembled poliomyelitis. In the last few weeks I have seen one case, similar to the foregoing as regards onset, but in which only spinal symptoms have appeared, and another case in which the diagnosis remains in doubt between this disease and poliomyelitis.

The prognosis generally seems to be more favourable than the record of these few cases implies. In Redlich's cases complete recovery was the rule and fatalities were few. In Pette's series of 25 cases most of the patients made good recoveries and there were only two deaths. Hunter and Brain reported four complete recoveries and one death among their six cases. Recovery may be incomplete and permanent defect remain, but no "after-effects" in the sense of disabilities developing after apparent recovery have, to my knowledge, been described.

I am, Sir, yours faithfully,

J. PURDON MARTIN.

Harley-street, W., Sept. 17th, 1928.

THE LATER RESULTS OF PARTIAL GASTRECTOMY FOR GASTRIC AND DUODENAL ULCER.

To the Editor of THE LANCET.

SIR,—Dr. Arthur Hurst's letter in THE LANCET of Sept. 1st cannot be allowed to pass without comment. He says: "Our experience shows that gastro-enterostomy is the commonest gastric disorder to-day, and undoing gastro-enterostomies is the operation we now most frequently recommend." This emphatic opinion from so eminent an authority might cause considerable confusion in the mind of the profession, if he had not spoilt the first part of this terse paragraph by figures cited immediately before it—viz., since 1921 there had been at the New Lodge Clinic 37 patients suffering from gastric ulcer, 165 from duodenal ulcer, and 67 from the ill-results of gastro-enterostomy or partial gastrectomy. So on his own showing gastro-enterostomy is not the commonest gastric disorder of to-day. Moreover, he does not indicate a very obvious point, which is that his clinic naturally collects failures.

Against Dr. Hurst's statement that the undoing of gastro-enterostomy is the operation he now most frequently recommends I put this one—of the hundreds of gastro-enterostomies I have done myself for duodenal ulcer and of the thousands I know which have been done by my colleagues, I cannot recall a single case in which the gastro-enterostomy has been subsequently undone, except where a jejunal ulcer has developed, and then, of course, it is the jejunal ulcer which is the disorder and not the gastro-enterostomy. But I suppose all of us have undone gastro-enterostomies performed where there was no sign of ulcer, past or present, and possibly Dr. Hurst has this class of case in mind when he makes the sweeping statement quoted above. In Leeds we have put this kind of surgery behind us long ago.

I am, Sir, yours faithfully,

Park-square, Leeds, Sept. 17th, 1928. E. R. FLINT.

To the Editor of THE LANCET.

SIR,—I find it a little difficult to reply, at one and the same time, to Dr. Hurst and Mr. Flint, for while the one ironically suggests that all operative procedures on the stomach are doomed to ultimate failure and that the commonest gastric operation of to-day is the undoing of gastro-enterostomies, the other tells us that the unsatisfactory results of gastro-enterostomy, far from reaching the 36 per cent. suggested in my article, are not more than 10 per cent., and that in many of these the symptoms are so slight that the cases could be considered satisfactory. Were I not very deeply impressed by the fact that in the present state of our knowledge of gastric and duodenal ulceration it is impossible to be categorical (even that surgical treatment is useless) I should find it impossible to reconcile these two opinions. Without reopening the whole question, however, there are certain explanatory points to which I should like to refer.

Both Dr. Hurst and Mr. Flint appear to be unfavourably impressed by the fact that I use the ability to take all kinds of food without restriction as one of my criteria of cure. But could any test be more appropriate, especially from the patient's point of view? If he has to continue upon a special restricted

diet for the rest of his life he can scarcely regard himself as cured in the truest sense of that word, whether such a dietary be the sole treatment or merely the complementary treatment of a gastro-enterostomy. Unfortunately the cases of gastro-enterostomy included in my unsatisfactory group have had perforce to continue with such treatment for much longer periods than the three to six months which I claim should be sufficient if an operation is really curative. That a comparatively large ulcer will heal in such time if placed under the best conditions has been amply proved both by subsequent operations and radiographically. If operative or other treatment has brought about complete cure there should be no need for further dietetic restriction beyond this period, and it is in this respect particularly that the results of partial gastrectomy have turned out much more satisfactory than those of gastro-enterostomy, as indeed Mr. Flint's experience of the necessity for medical treatment "long afterwards" in the latter operation suggests.

It has been my ill-fortune, too, to meet several cases where following gastro-enterostomy for duodenal ulcer the patient remained completely free of digestive symptoms, but hæmorrhage or perforation many years later showed that the ulcer was still active, or, what is more probable, that fresh ulceration had occurred owing to the fact that the operation had not dealt satisfactorily with the cause, even although it had relieved the symptoms. This, indeed, is the crux of the argument—the relief of symptoms as opposed to the removal of the cause—and as far as the evidence of my cases goes it would appear that we are approaching the latter more closely by the performance of a partial gastrectomy than either by medical treatment or gastro-enterostomy. My attitude is, however, not a dogmatic one (the curtailment of the article to render it of suitable length for publication may perhaps have conveyed a wrong impression) and I realise to the full that the last word has not been said; yet the results in the cases of this series cannot be gainsaid, and in the absence of further knowledge they justify the recommendation of an operation which, in view of its mortality, any surgeon might otherwise hesitate to perform.

It would be interesting to learn what Dr. Hurst has to suggest, as an alternative, for those cases in acute agony who have already had a succession of medical treatments with almost immediate recurrence, and what prospects he has to offer them of returning to their former livelihood, often of an arduous nature, with little opportunity, either financial or otherwise, for carrying out any strict dietetic régime. The majority of the gastrectomy cases quoted in my article are men and women of the labouring classes who have returned to their former occupations without dietetic restrictions. But perhaps patients of this type do not find their way to the New Lodge Clinic.

I am, Sir, yours faithfully,

NORMAN C. LAKE.

Welbeck-street, W., Sept. 17th, 1928.

BLEPHARITIS SUCCESSFULLY TREATED BY AN AUTOGENOUS ANTIVIRUS.

To the Editor of THE LANCET.

SIR,—It will be interesting to hear if Dr. Armstrong's case of blepharitis treated by bacteriological methods maintains freedom from relapse. During the last year every case of severe blepharitis seen by me in private practice, and in the out-patient departments of two London hospitals, has been found to be associated with gross focal sepsis. When the origin of the focal sepsis has been dealt with, usually either by the dental surgeon or the throat surgeon, combined with mild local treatment, the blepharitis has been permanently cured.

I am, Sir, yours faithfully,

A. F. MACCALLAN.

Welbeck-street, W., Sept. 15th, 1928.

INSOLATION IN PULMONARY TUBERCLE.

To the Editor of THE LANCET.

SIR,—I am glad to see attention called to the danger of rest in hot sunshine for those who are suffering from pulmonary tuberculosis. Verandas on the south side are commonly provided in sanatoria; but medical officers of experience know that it is unwise to use them in hot weather. All such structures should have ample gaps in the roof for ventilation or a discontinuous double roof. At Pinewood Sanatorium, Wokingham, a northerly veranda is provided as an alternative; in other institutions, rest shelters in shady situations. Even an open tiled terrace with awning next the building may be undesirably hot in summer. On the other hand, in dull or cold weather in this country we need all the sunlight available, so that permanent verandas in front of bedrooms have their drawbacks. At the Crooksbury Sanatorium awnings which can be furled are provided instead, and covered places not in front of the bedrooms; but in hot weather, for non-febrile patients, rest under the pine trees has often been preferred. To clear away all the trees from the vicinity of a sanatorium is a great mistake. Asphalted paths may be undesirably hot in summer for phthisical patients; dry walks, carpeted with pine-needles, are preferable. Sunshine treatment in "surgical" tuberculosis needs caution; in the pulmonary varieties it is dangerous to the febrile, and in some other cases.

I am, Sir, yours faithfully,

Farnham, Surrey, Sept. 14th, 1928. F. R. WALTERS.

BRITISH SOCIAL HYGIENE COUNCIL.

To the Editor of THE LANCET.

SIR,—Owing to the growing work of the British Social Hygiene Council it has been found necessary to obtain the services of a whole-time salaried medical secretary who is able to undertake medical educational work in connexion with the general organisation of the Council in all parts of the country. The medical secretary would also give assistance in the general work of the Council. As this entails a considerable amount of public speaking preference will be given to those accustomed to handling both medical and lay audiences. The post would give scope for anyone interested in research on venereal subjects and would probably be suitable for a younger man retired from one of the services. The work of the medical department is under the direction of the honorary medical secretaries and the medical advisory board. Further particulars are given in your advertisement columns.—We are, Sirs, yours faithfully,

KENNETH M. WALKER.
A. H. HARKNESS.
Hon. Medical Secretaries.

Carteret House, Carteret-street, London, S.W.
Sept. 15th, 1928.

B.M., B.Ch. Oxon. has omitted to enclose his card.

SUCCESS OF BIRMINGHAM CONTRIBUTORY SCHEME.—This scheme, which was started only eight months ago, already has 306,000 members and £61,000 has been paid to the hospital. This result is mainly due to the development of the Hospital Saturday Fund, which last year distributed £44,000. One of the conditions upon which the scheme was established was the abolition of notes and tickets.

TUBERCULOSIS DISPENSARY IN MANCHESTER.—The Ministry of Health has given notice that a public inquiry into the proposal of the Manchester Corporation to build a dispensary for the treatment of tuberculosis upon the vacant plot of land at the corner of Oxford-road and Denmark-road, opposite the Royal Infirmary, will be held in Manchester Town Hall on Oct. 11th. During the debate in the city council the recommendations of the public health committee were approved, being opposed by only one member.

Obituary.

JOSEPH JOHN PERKINS, M.B. CAMB., F.R.C.P. LOND.

THE death on Sept. 13th of Dr. J. J. Perkins, at the age of 65 years, has come as a grievous blow to his large circle of friends. Affectionately known as "J. J." to most of his contemporaries, he was held in high esteem by his colleagues and former clerks, and was beloved by his patients, the secret of his genius for friendship being unselfish sympathy and generosity.

Born in 1863, Perkins started his career with a wide knowledge of the classics and of history acquired at Manchester University; it was not until he went up to Cambridge as an exhibitioner to Emmanuel College that his thoughts turned towards medicine. He became a scholar of his College and took a first-class in 1888 in the Natural Science Tripos before entering St. Thomas's Hospital at a slightly older age than the average medical student. Gifted with a retentive memory and with a keen incisive mind, he came early under the influence of the late Dr. J. S. Bristowe, who profoundly impressed him and for whom he entertained always the deepest admiration and esteem.

DR. PERKINS.

On qualifying in 1891 Perkins held house appointments at St. Thomas's and Brompton, taking every opportunity of increasing his experience, and in his long association with these two hospitals developing a clinical acumen and a deep knowledge of treatment which made his opinion much sought after, with the result that he acquired a very considerable consulting practice, not only in regard to diseases of the chest, his more immediate specialty, but also in regard to difficult cases in general. He would listen keenly to the history; then, after a quick but thorough examination, he not infrequently made a diagnosis in difficult cases surprising in its accuracy and brilliance. Although keenly impressed with the value of the older methods of physical examination he was quick to adopt new methods and applied them with a due sense of perspective. His ability, sympathy, and the practical helpfulness of his suggestions combined to secure for him the special professional distinction of being a doctor's doctor. He was for many years secretary of the National Council for the Prevention of Tuberculosis, devoting his time unstintingly to this work, so that his place will be hard to fill.

After an attack of rheumatic fever in early youth he was never robust, and in the later years of his life his health was far from good. In spite of this he worked extremely hard until a serious illness some ten years ago when he was away from work for many months. On returning, though he continued to practise, he restricted his private work, and about four years ago he decided to give up all professional activities. From this time onwards he devoted himself to his numerous interests, and was apparently happy in his keen enjoyment of them. He read deeply in the classics, took long motor drives to distant churches, where he indulged his love of architecture and increased his profound knowledge of monumental brasses and of old stained glass.

In congenial circumstances Perkins was a brilliant conversationalist and a witty companion with a keen sense of humour. His hearty appreciation of an apt reply or an amusing anecdote will long remain as a pleasant memory to his friends. But in spite of his large sympathies and of his wide circle of friends, there was even to those who knew him best a strange reticence, due to a sensitive nature and a modesty amounting almost to diffidence. It was this that prevented him from writing much in the medical journals and from producing books—a real loss to medicine, since he had garnered much medical wisdom which he was only able to impart to those coming immediately under his personal influence.

Of Perkins's genius for friendship we have received remarkable testimony of which only fragments can be quoted. The colleague who supplied the biographical notes writes: "I owe much to his stimulus, criticism, and wisdom, and find it hard to realise that the friend and counsellor of the whole of my medical life has departed. Perkins will be missed also, not least, by the young sons of his friends, to whom he was ever ready with sympathy, stimulus, and help." Another colleague says: "The beginning of my friendship with Perkins dates back to the time when I was a clinical clerk, and though as house physician he would of course possess what to the student seemed a profound knowledge of medicine, yet the main impression he left on me was not only that of a remarkably good house physician. Much more did he impress me even then with his kindly thoughtfulness and shrewd humour and above all with what I now realise was the early maturity of his outlook. The soul of loyalty to his hospital and a staunch colleague, his attachments were deep and enduring and he was never happier than when spending a week-end with some sanatorium friend. He was a good conversationalist, but in his long talks by the fireside, interesting, amusing, and stimulating as they were, he studiously avoided any reference to himself. Sociable he was and a delightful companion, but he viewed the world in a detached and impersonal fashion and held himself rather aloof from the rough and tumble of life. Good health he lacked, but as far as he could he hid this from the world and in his outward bearing he showed little evidence of the recurring outbreaks of tuberculosis which dogged his footsteps throughout life. The picture which I think Perkins will leave in the minds of most of us is that of a man of distinguished bearing, thin, fastidious in his dress, cheerful and often gay, mildly sardonic at times, but eminently courteous and considerate and always with a rather proud reserve concerning himself."

J. G. E. writes: "It was 32 years ago that I first met Perkins when I was house physician at the City of London Hospital, and to-day I mourn one of the best friends a man ever had. He was a man of many friends and he made us all realise the fullest meaning of that word, for with absolute obliteration of self he entered wholeheartedly into our lives and made our interests his own. He was always ready to encourage and help when we were in doubt, and many of us have reason to be profoundly thankful for his sound judgment and wise counsel."

ALBERT WILSON, M.D. EDIN.

Dr. Wilson, who died at Fairwarp, near Uckfield, on Sept. 9th, was in his seventy-fifth year. He was born at Newcastle-on-Tyne, educated at the Friends' School, York, where he developed a marked taste for natural science, and went on to Edinburgh University, taking the gold medal in his M.D. for a thesis on heart diseases and, later on, visiting the Universities of Paris, Vienna, Berlin, and St. Petersburg. After qualifying in 1878 he was house surgeon at the Royal Infirmary, Edinburgh, and resident physician to the Cowgate Dispensary, playing a

prominent part at the Royal Medical Society, of which he was president in 1879. Moving to London he had at first a City practice, but his interests tended more and more in the direction of the study of psychology, especially criminal psychology, and he became medical officer to the Walthamstow Branch of the Essex Asylum, doing much unostentatious work among poor folk in the East End. His varied publications included books on Education, Personality and Crime (1908), Unfinished Man (1910), and papers on multiple personality. At the time of his death he had just corrected the final proofs of a book entitled The Child of Circumstance, being a sociological study of the criminal couched in simple non-technical language and embodying the author's faith in the possibility of physical and mental improvement for the most degraded class of humanity. Dr. Wilson served with the French Red Cross in the early part of the war, and made a contribution on war wounds. All his life a keen traveller, his holidays were generally spent in some foreign clinic, where he added to his store of curious knowledge. Latterly he confined himself to consulting work. Dr. Wilson married, in 1881, Amy, daughter of Surg.-Capt. J. C. Minto, M.D., who survives him with two daughters.

Colonel Sir JOHN HEWAT, who died at Port Elizabeth on August 20th, took a prominent part in South African affairs in the intervals of a busy professional life spent in practice at Woodstock, a suburb of Cape Town. Born in Sarawak in 1863, he was a son of the late Captain John Hewat, of Cape Town, and was educated at George Watson's College, Edinburgh, and at the South African College, Cape Town. After graduating in medicine at Edinburgh University in 1887, he settled at Woodstock and became one of the leading practitioners there. He entered the old Cape House of Assembly as Progressive Member for Woodstock in 1904, and was re-elected in 1915 to sit in the Union Assembly. Under the leadership of the late Sir Starr Jameson he was for some years Chief Whip of the Unionist Party. Joining the Cape Garrison Artillery as a young man, he enjoyed long service as an officer of the corps, from which he retired with the rank of captain. At the Coronation of the present King he was one of the delegates chosen to represent South Africa and he was also one of a delegation from the Union which visited the war zone in 1915. He served in the brief German South-West campaign in 1915 as lieutenant-colonel in the South African Medical Corps, being mentioned in despatches, and was promoted to the rank of full colonel in 1917. He was knighted in 1919. A keen sportsman, Sir John was a steward of the South African Turf Club, and also president of the Cape Colony Athletic and Cycling Union.

Dr. F. J. NICHOLLS, who died at Eastbourne on Sept. 1st after a month's illness at the age of 58, was well known throughout the locality not only as a practitioner but as a sportsman. The son of Mr. E. W. Nicholls, of Eastbourne, he was sent to Rugby School, where he played in the XI. in 1888 and 1889. Thence he went up to St. John's College, Cambridge, and he studied medicine both there and at Guy's Hospital, qualifying as M.R.C.S. in 1899, and as M.B. in the following year. After special experience at the City of London Hospital for Diseases of the Chest, Victoria Park, and elsewhere, he settled in practice at Eltham, moving to Eastbourne some 19 years ago. During the war he did valuable work as anæsthetist to the war hospitals in the vicinity, and held a commission with the Sussex Volunteers. Outside his professional work he was an enthusiastic tennis player and golfer, and in former years played for the Eastbourne Cricket Club. His widow, the daughter of Mr. H. Simpson Gee, survives him with three sons and a daughter.

The death of Dr. OWEN PRITCHARD, at the age of 75, removes a distinguished member of the Welsh community in London. Educated at St. Bartholomew's Hospital he graduated as L.S.A. in 1880 and as M.D. in the University of Brussels three years later. Entering practice in London he became physician and later surgeon to St. Saviour's Hospital for Cancer and Diseases of Women, and made a number of contributions to professional journals. He was also associated with several other charitable institutions. In 1906 he was appointed High Sheriff for the county of Anglesey, and for the later years of his life was closely connected with the University of Bangor, which last year conferred upon him the degree of LL.D. in recognition of his services. Dr. Pritchard, who was unmarried, was a collector of books and china, and it is stated that some of his valuable furniture has been left to the National Museum of Wales. The funeral took place on Sept. 3rd.

Dr. WILLIAM MACFIE CAMPBELL, who died on Sept. 13th in his eightieth year, was a graduate of the University of Edinburgh, where he took the M.B. degree in 1869 and won the gold medal for his doctor's thesis in 1873. After post-graduate experience at Paris and Vienna, he went to Liverpool as house surgeon to the Northern Hospital, and it was not long before he was appointed to its consulting staff, as well as to that of other institutions in the neighbourhood, including the Liverpool South Dispensary. Interested especially in gynæcology, he published a considerable number of papers, chiefly in the *Liverpool Medico-Chirurgical Journal*, and won a high reputation among his colleagues, who elected him to various offices in the Liverpool Medical Institution, the most important centre of medical activity and interest in the city. Dr. John Hay, as president of this society, writes of him as follows: "I should like to put on record an appreciation of the valuable work done by him for the profession in Liverpool, and, more particularly, for the Medical Institution. In 1871 he became a member; from 1875 until 1901 he was continuously in office; and during 1898 and 1899 he was president of the Institution. But whether in office or out of office, he gave freely of his time and brains. He served the Medical Institution and the profession ungrudgingly, unselfishly, and wisely; and the vigorous health of our Society at the present time is in no small measure due to his sustained efforts. He has left us a noble tradition." Dr. Campbell had at one time probably the largest practice in the South End of Liverpool, and won the affectionate regard of his many patients. In his earlier days he was attached as surgeon to the 2nd Volunteer Battalion of the King's Liverpool Regiment, and in later life gave public service as a justice of the peace. His death will be regretted by a large circle in Liverpool.

Medical News.

ROYAL COLLEGE OF SURGEONS OF ENGLAND.—The following demonstrations of specimens in the Museum will be given at 5 P.M. in the theatre of the College in Lincoln's Inn-fields. The demonstrations are open to advanced students and medical practitioners. On Oct. 19th Sir Arthur Keith will discuss problems in human anatomy which arise out of the identification of a skull attributed to Lord Darnley, showing illustrative specimens. On Oct. 26th he will trace the development, and on Nov. 2nd the evolution, of the human foot in relation to orthopædic disorders. On Oct. 22nd and 26th and Nov. 5th Mr. T. W. P. Lawrence will comment on surgical specimens.

POST-GRADUATE COURSES IN FRANCE.—A series of courses on the diagnosis and treatment of cancer will be held at Strasbourg from Oct. 16th–31st, under the direction of Prof. Gunsett, to whom application may be made at the Centre Anticancéreux, Hôpital Civil, Strasbourg, Alsace. Dr. C. Laubry has arranged a course on diseases of the heart and circulation and of the blood, to be given at the Hôpital Broussais, 96 rue Didot, Paris XVI., from Oct. 8th to 20th. Particulars may be had from Dr. Moussoir at the hospital.

UNIVERSITY COLLEGE HOSPITAL MEDICAL SCHOOL.—The winter session of this school will open on Monday, Oct. 1st, when an introductory address will be given in the Library, at 4.30 P.M., by Sir Thomas Barlow, F.R.S.

WESTMINSTER HOSPITAL MEDICAL SCHOOL.—The annual dinner of past and present students will take place in the Royal Adelaide Galleries, Gatti's Restaurant, Strand, on Monday, Oct. 1st, at 7 P.M. for 7.30, Sir James Purves-Stewart in the chair.

CHELSEA CLINICAL SOCIETY.—The annual dinner will take place at the Hotel Rembrandt, Thurloe-place, London, S.W., on Oct. 23rd, at 7.30 P.M. Those intending to be present are requested to communicate with Mr. L. A. Harwood, 90, Sloane-street, London, S.W. 1, as early as possible.

CANCER CAMPAIGN IN THE NORTH.—The campaign against cancer in Lancashire, Cheshire, and North Wales will now be resumed energetically, and the Council hopes that before the end of the year the sum of £200,000 will have been collected in this area, another £90,000 being required to this end.

ST. BARTHOLOMEW'S HOSPITAL, ROCHESTER.—The inadequate pathological department of this institution has been removed to an adapted water-tower, formerly part of a brewery, at the back of the buildings. St. Bartholomew's was the first general hospital in Kent to possess such a department. The staff deal with some 6000 cases per annum.

EXTENSION OF RUGBY HOSPITAL.—A new out-patient department and casualty wards are being erected at Rugby Hospital. Mrs. Arthur James, who recently laid the foundation-stone, has contributed £8000 towards the cost, as a memorial of her late husband. The penny-in-the-pound scheme in aid of this hospital, which was started only two years ago, has 11,400 contributors.

BLACKPOOL VICTORIA HOSPITAL.—The board of management have decided to build an entirely new hospital of 150 beds on a fresh site at a cost of about £100,000. The existing buildings are officially described as "absolutely out of date." The children's ward is a temporary wooden building, there are no separate medical and surgical wards, the nurses live away from the hospital, an annexe of 20 beds is separate from the other buildings, the administrative block is "totally inadequate," and the out-patient department is "unsatisfactory."

GERMAN CONGRESS OF UROLOGY.—The eighth annual session of the Deutsche Gesellschaft für Urologie takes place at the Langenbeck-Virchow-Haus in Berlin from Wednesday, Sept. 26th, to Saturday, the 29th, under the presidency of Prof. Alex. v. Lichtenberg (Berlin). At the opening sitting on Wednesday Prof. C. Posner (Berlin) will deliver an oration on Max Nitze in memory of the jubilee of the invention of the cystoscope. On the same day Dr. Viktor Blum (Vienna) will open a discussion on hypertrophy of the prostate and diverticula of the bladder, and Dr. Rudolf Paschkis (Vienna) on chronic non-specific ulcers of the bladder. On Thursday will come up for discussion the pathology and treatment of malformations of the kidney and ureter, on Friday strictures of the urinary passages, and on Saturday the relations of urology to social legislation. There will be an exhibition of instruments, apparatus, and books during the Congress. Further information from Dr. Arthur Lewin, Berlin, W.50, Tauentzienstrasse 13.

POST-GRADUATE STUDIES IN MANCHESTER.—Post-graduate work for the coming year in Manchester will follow the lines of previous years. Besides the teaching which leads to diplomas in special subjects, such as public health and psychological medicine, the University is undertaking set courses in special subjects. A whole-time intensive course in general medicine and surgery is at present in progress and will be followed by a short similar course in obstetrics and gynæcology, beginning on Sept. 29th. Part-time courses in ophthalmology will start in October, and in radiological work, diseases of the skin, and clinical pathology in the new year. Clinical assistantships are obtainable at several of the general and special hospitals. The hospitals also give courses in different parts of the year. The first part of the Royal Infirmary course lasts from Sept. 25th to Dec. 11th, and consists of individual lectures on independent subjects. The lectures are on Tuesday and Friday afternoons. On Oct. 23rd Sir Berkeley Moynihan will give the Lloyd Roberts lecture, his subject being Some Problems in Gastric Surgery. At Ancoats Hospital short courses will be given on Thursday afternoons on the sympathetic nervous system, minor operations on the ear, nose and throat, and on advances in antiseptics.

Dr. Kinnier Wilson has been made an honorary corresponding member of the Gesellschaft Deutscher Nervenärzte.

NEW HOSPITAL AT BAKEWELL.—On Sept. 11th the Duke of Devonshire opened a new infectious diseases hospital at Bakewell, Derbyshire, which will meet the needs of six urban districts and one rural district. The hospital cost £9500 and includes three blocks of buildings.

DUDLEY GUEST HOSPITAL.—This hospital is about to be enlarged from 104 to 185 beds. The existing buildings are, to a certain extent, to be modernised, and the additions will include two ward units of two storeys each and eight single-bed observation wards.

Medical Diary.

Information to be included in this column should reach us in proper form on Tuesday, and cannot appear if it reaches us later than the first post on Wednesday morning.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, W.
MONDAY, Sept. 24th to SATURDAY, Sept. 29th.—ROYAL FREE HOSPITAL, Gray's Inn-road, W.C. Course in Electro-Therapy by Dr. C. B. Heald. Four lecture-demonstrations on successive Wednesdays at 5.15 P.M. WESTMINSTER HOSPITAL, S.W.—Special post-graduate Course in Medicine, Surgery and the Specialties. All day course.—ROYAL EYE HOSPITAL, St. George's-circus, S.E.—Every afternoon. Course in Ophthalmology.

ROYAL NORTHERN HOSPITAL, Holloway-road, N.
TUESDAY, Sept. 25th.—3.15 P.M., Dr. E. H. Shaw: Demonstration of Immediate Microscopic Examination of Tumours.

CENTRAL LONDON THROAT, NOSE AND EAR HOSPITAL, Gray's Inn-road, W.C.
MONDAY, Sept. 24th.—1.30 P.M.: Hearing Tests.
WEDNESDAY.—1.30 P.M.: Examination of the Sinuses.

MANCHESTER ROYAL INFIRMARY.
TUESDAY, Sept. 25th.—4.15 P.M.: Mr. W. R. Douglas: Demonstration of Surgical Cases.
FRIDAY.—4.15 P.M.: Dr. P. B. Mumford: Some Problems in the Diagnosis and Treatment of Syphilis.

Appointments.

BARKER, H. L., L.R.C.P. Lond., M.R.C.S., D.P.H., has been appointed Medical Officer of Health, Ilkeston.

CHALLANS, F., M.D. Lond., Regional Medical Officer for the Ministry of Health in Devon, Cornwall, and Somerset.

JONES, E. H., M.D., C.M. Edin., Medical Officer of the Rhyl Medical Relief District of the St. Asaph Union.

KENNEDY, A. D., M.D. Glasg., to be a Medical Referee under the Workmen's Compensation Act for Wick in the Sheriffdom of Caithness, Orkney, and Shetland.

STRACHAN, C. H., M.B., Ch.B. Aberd., Resident House Surgeon, Batley Hospital.

Certifying Surgeons under the Factory and Workshop Acts: FARRER, R. T., M.R.C.S. Eng., L.S.A. (Brighthouse, W. Riding); MAIR, W. B. G., M.B., Ch.B. Glasg. (Carnwath); ROCHE, G. D., L.R.C.P. & S. Edin., L.R.F.P.S. Glasg. (Scalloway, Shetland); and WATERHOUSE, A. R. (Wirksworth).

Vacancies.

For further information refer to the advertisement columns.

Belgrave Hospital for Children, 1, Clapham-road, S.W.—H.S. Also Asst. H.P. Each at rate of £100.

Birmingham General Hospital.—Asst. S. £50.

Bridgetown, Barbados General Hospital, B.W.I.—Sen. Res. S. £300.

Brighton, Royal Alexandra Hospital for Sick Children.—H.P. £100.

British Medical Association, Tavistock-square, W.C.—Librarian. £400.

British Social Hygiene Council, Carteret House, Carteret-street, S.W.—Medical Secretary. £400.

Burnley, Victoria Hospital.—H.P. At rate of £125.

Cambridge, Addenbrooke's Hospital.—H.S. At rate of £130.

Carlisle, Cumberland Infirmary.—H.S. to Special Depts. At rate of £155.

Evelina Hospital for Children, Southwark, S.E.—H.P. At rate of £120. Also Hon. Asst. Aural Surg.

Exeter, Royal Devon and Exeter Hospital.—H.P. At rate of £130.

Gloucestershire County Council.—M.O. for Maternity and Child Welfare. £750.

Gloucester, Gloucestershire Royal Infirmary, &c.—H.P. At rate of £150.

Greenwich Metropolitan Borough.—M.O. for Maternity and Child Welfare Work. £600.
Guildford, Royal Surrey County Hospital.—H.S. £150.
Hospital for Sick Children, Great Ormond-street, W.C.—H.S. Also H.P. Each at rate of £100. Also Part-Time Jun. Cas. O. At rate of £150.
Hospital of St. John and St. Elizabeth, 60, Grove End-road, W.—Res. H.S. At rate of £75.
Huddersfield Royal Infirmary.—Pathologist. £750.
Infants Hospital, Vincent-square, Westminster.—Med. Reg. £120.
Jersey General Hospital and Poor-law Infirmary.—Res. M.O. £200.
Leeds, St. James' Hospital.—H.P. and S. £200.
Liverpool, Eye and Ear Infirmary, Myrtle-street.—H.S. £100. Also Hon. Asst. Surgeon to Ear, Nose and Throat Department.
Liverpool Sanatorium, Delamere Forest, Frodsham.—Asst. to Med. Supt. £250.
London Hospital, E.—First Asst. and Registrar to one of the five Surgical Firms. £300.
London Temperance Hospital, Hampstead-road, N.W.—Res. M.O. At rate of £175. Cas. O. At rate of £120. Also H.P. At rate of £100.
Macclesfield General Infirmary.—Res. H.S. £180.
Macclesfield, Parkside Mental Hospital.—Res. Clin. Asst. £75.
Maidstone, Kent County Mental Hospital.—Asst. M.O. £300.
Manchester, Monsall Hospital.—1st Asst. M.O. £600.
Mauritius, Port Louis.—M.O.H. £900.
Metropolitan Ear, Nose and Throat Hospital, 2, Fitzroy-square, W. Anæsthetist.
Middlesex Hospital, W., Feren's Institute of Oto-Laryngology.—Bernhard Baron Research Scholarship. £300.
National Hospital, Queen-square, W.C.—Asst. P.
Norwich, Norfolk and Norwich Hospital.—H.S. and Cas. O. Each £120.
Nuneaton Borough.—Asst. M.O.H. £600.
Prince of Wales's General Hospital, Tottenham, N.—H.S., Special H.S., and H.P. Each at rate of £120. Also Jun. H.S. and Jun. H.P. Each at rate of £90.
Public Dispensary, 122, Drury-lane, W.C.—Res. M.O. £120.
Queen's Hospital for Children, Hackney-road, E.—Physician-in-Charge Skin Department.
Royal College of Physicians, Pall Mall East.—Milroy Lecturer.
Royal Eye Hospital, St. George's Circus, S.E.—Clinical Assistants.
Royal Free Hospital, Gray's Inn-road, W.C.—Cas. O. £150.
St. Mark's Hospital for Cancer, &c., City-road, E.C.—H.S. At rate of £75.
Samaritan Free Hospital for Women, Marylebone-road, N.W.—Hon. S. to Out-patients.
Southampton, Borough Isolation Hospital.—Res. M.O. £360.
Southern Rhodesia Medical Service.—Govt. M.O. £500 to £600.
Swansea Hospital.—Two H.S.'s. £150.
Warrington, County Mental Hospital, Winwick.—Asst. M.O. £350.
Willesden General Hospital, Harlesden, N.W.—Res. H.S. At rate of £100.

The Chief Inspector of Factories announces a vacancy for a Certifying Factory Surgeon at Pangbourne (Berks.).

Births, Marriages, and Deaths.

BIRTHS.

BROOKE.—On Sept. 13th, the wife of Ralph Brooke, M.B., F.R.C.S., of a daughter.
CAMERON.—On Sept. 12th, in a nursing home, Belfast, the wife of Captain W. Moore Cameron, O.B.E., R.A.M.C., of a son.
CORNER.—On Sept. 8th, in a nursing home, Bournemouth, the wife of Dr. H. W. Corner, of a daughter.
GAUSSEN.—On Sept. 7th, in a nursing home, Herne Bay, the wife of Surgeon Lieut.-Commander J. F. H. Gaussen, M.B., R.N., of a daughter.
HARDIE.—On Sept. 11th, at King-street, Great Yarmouth, the wife of Ronald W. W. Hardie, M.B., Ch.B., of a daughter.
LISTON.—On Sept. 15th, at Milner-street, Cadogan-square, S.W., the wife of Dr. R. Prosper Liston, of a son.
PORTER.—On Sept. 13th, at Kidderminster, the wife of Dr. C. Petvin Porter, of a daughter.

MARRIAGES.

LAWRENCE—BATSON.—On Sept. 7th, at Holy Trinity Church, Brompton, Robert Daniel Lawrence, M.D., to Doreen Nancy (Anne), only daughter of Mr. and Mrs. T. Batson, Overstrand-mansions, Battersea, S.W.
MURPHY—MURPHY.—On Sept. 1st, at Brompton Oratory, Major Denys Murphy, *M.C.*, F.R.C.S., I.M.S., to Vera, elder daughter of Mrs. Murphy, Greenleaze, Knowle, Bristol.

DEATHS.

CAMPBELL.—On Sept. 13th, at his residence, Shrewsbury-road, Birkenhead, William Macfie Campbell, M.D., J.P., late of Liverpool, in his 80th year.
EDGELOW.—On Sept. 14th, at Braddon Villa, Torquay, William Ford Edgelow, M.D., aged 75.
FORBES.—On Sept. 17th, at Cuminestown Turriff, Aberdeenshire, Hugh McGregor Forbes, L.R.C.S., L.R.C.P. Edin.
PERKINS.—On Sept. 13th, Joseph John Perkins, M.A., M.B. Camb., F.R.C.P. Lond., aged 65.
PHILLIPPS.—On Sept. 12th, suddenly at Seafield, Paignton, William Alfred Phillipps, M.D.
WYNDHAM.—On Sept. 7th, in London, Thomas Lancelot Wyndham, L.R.C.S. & P. Edin., aged 54.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

Notes, Comments, and Abstracts.

THE INFLUENCE OF INDUSTRIAL POISONS UPON THE DIFFERENT ORGANS.*

BY SIR THOMAS OLIVER, M.D., F.R.C.P.

WHEN a poison has been absorbed and has circulated in the blood, it might be expected that the whole body would more or less suffer simultaneously, but experience shows that certain organs and tissues exercise a selective influence upon some poisons and not upon others. A distinction must be made between acute and chronic forms of industrial poisoning. There is the opinion that those tissues of the body which are the last to be developed, and therefore the more delicately organised, are less resistant, hence the rapidity of the effects of alcohol upon the higher nerve centres in the brain. While the nervous system is not free from the harmful influences of lead, many research workers regard the blood and the hæmopoietic system as the anatomical elements earliest affected by lead, those bodily units, in fact, which are formed and function in the early stages of embryonic development, and which therefore ought to be the most stable. It is an interesting circumstance that while the blood and blood-making organs are readily influenced by lead, yet in the blood very little of the metal is found, even while the internal organs may contain it in considerable quantity. Although the blood may show physical and chemical changes due to the influence of lead, it has only slight retentive power upon the metal, possibly because the blood is ever changing and therefore rejuvenating itself, its corpuscles are short-lived, also that it is constantly eliminating the poison, while in the tissues generally, physico-chemical changes are less rapid, and there is therefore given greater opportunity for the metal to become more firmly linked to the cellular constituents.

The types of industrial poisoning which have the greatest interest for us are those where the amount of toxin received daily into the system is small, where elimination almost equals absorption, and where therefore poisoning is slowly induced. In many of these cases, symptoms of toxæmia may not arise for several years; so slowly, in fact, do the symptoms appear that the individual is not aware of his condition until some change occurs in his metabolism or he is attacked by some minor ailment.

Lead.

It is now several years since I remarked upon the storage of lead in a rather insoluble form in the body, also upon the absence of symptoms, until there have occurred chemical changes in the liquor sanguinis and the fluids bathing the tissues, whereby the deposited lead becomes soluble, thus favouring its reabsorption into the circulation. To this subject and the early harmful effects of lead upon the blood, Aub and his co-workers in Harvard University have given close attention, as also have Kehoe and Thamann, of the University of Cincinatti, and P. Schmidt, of Halle, who hold, like many other physicians, that, by a microscopical examination of the blood of lead-workers, plumbism may be detected before symptoms develop, and when, therefore, it is possible for further trouble to be averted. The relation of the blood to poisons passing through it are of a two-fold character; the blood may be little affected or physico-chemical changes are induced in it which affect its efficiency as an oxygenating and nutritive medium.

So far I have dealt mainly with lead, principally because, apart from iron and steel, lead is the metal which is most widely used in the industries, also because it has been the occasion of much ill-health among the workers. Most of its salts, too, have the power of precipitating proteins, as observed on mucous membranes, thereby exercising a protective influence compared with the corrosive effects produced by several other industrial poisons. Absorption of the metal is slow, so that time and opportunity are given for lengthened reaction to take place between the poison and the animal tissues.

Industrially, lead poisoning is seldom acute. When large doses of lead acetate have been swallowed by a healthy person, the symptoms which follow are less the result of absorption of the metal, than of the local effects of the lead compound upon the stomach and intestine. The intravenous injection of a neutral lead salt precipitates the proteins of the blood and may cause embolism. Harnack found in injecting lead-triethyl into the veins of animals that it became decomposed in the tissues and gave rise to symptoms of plumbism. Lead intravenously introduced

* Abridged from an address delivered to the Fifth International Congress for Industrial Accidents and Occupations in Budapest on Sept. 3rd, 1928.

into dogs causes paresis and paralysis, diarrhœa, colic, tremors, and convulsions. Harnack considered the diarrhœa to be the result of violent contraction of the intestinal wall, and that this persisted even when no peristaltic wave was passing. In my own experiments I found, after death, discontinuous portions of the small intestine, over lengths of 3 or 4 in., so firmly contracted as to have obliterated the intestinal canal, and which appeared to me to have been rather the cause and explanation of the colic.

In order to ascertain the effects of lead upon the heart and blood pressure, Sir Robert Bolam and myself carried out a series of experiments in which we introduced a solution of a lead salt directly into the blood stream. Our experiments showed that the result of injections of lead in animals was a general fall of the blood pressure.

There is a general opinion that workers in the lead industries in course of time develop structural changes in their arteries and have a high blood pressure. The numerous deaths among them from cerebral hæmorrhage lend weight to this supposition (but as the kidneys are prone to become diseased, inefficiency of these organs as a contributory cause cannot be ignored). We cannot quite place patients in whom symptoms of plumbism appear early in the same category with those who are the subjects of chronic plumbism, for in the latter structural changes have probably developed in the internal organs. One dose alone of lead hardly ever gives rise to symptoms, but if small quantities are repeatedly passed into the system through the alimentary canal or the lungs, chronic plumbism develops, indicating that absorption has taken place, and that possibly some of the lead may have become locked up in the tissues and from which it will be only slowly eliminated. The internal organs in which, after death, the metal is found are the liver, kidneys, brain, and bones. Lead is eliminated by the kidneys, the intestinal epithelium, the mammary secretion, and the saliva. Any effect, therefore, produced by lead is not so much due to the amount of the poison circulating in the blood at a particular time, nor to its deposition in the tissues, but, as Straub suggested, to the summation of the injuries inflicted by its recurrent presence in the blood in infinitesimal quantities.

Arsenic.

In Great Britain, since harmless pigments have replaced those containing arsenic in wall-papers and paints, industrial arsenical poisoning has considerably declined. In 1900 there were reported to the Home Office 22 cases of industrial poisoning due to arsenic, with three deaths; in 1926, five cases with three deaths; and in 1927, three cases with one death. Pure arsenic is insoluble in water, so that if swallowed it passes through the gastro-intestinal canal practically unchanged, although very minute portions might be converted into arsenious acid in the stomach and intestines. The symptoms caused by its compounds are less due to the metal itself than to the ions of arsenious acid, which if swallowed in fairly large doses cause violent abdominal pain, vomiting, and watery diarrhœa, muscular cramps, feeble pulse, coma, and death. It matters little the channel by which arsenic gains entrance into the body for the same gastro-intestinal events arise, showing that the mucous membrane of the alimentary tract is the medium whereby it is eliminated, although the metal may be found in the hair and also be a cause of pigmentation of the skin, as has been observed in chorea patients treated by increasing doses of liquor arsenicalis. Taken in medium doses over a varying length of time, it produces peripheral neuritis; an epidemic occurred in England a few years ago in beer-drinkers, the poison being traced to the glucose in beer which was obtained by sulphuric acid methods from iron pyrites containing arsenic. Yet, even to such a dangerous metal as arsenic, tolerance can be established by taking graduated quantities, as was shown a few years ago by the arsenic-eating peasantry of Styria and the Tyrol. These hill-men, swallowing arsenic in small but increasing doses, stated that it enabled them to climb the mountains with less effort, and that it improved their respiratory powers, while their women-folk believed that it improved their complexion. The practice did not appear to exercise any harmful influence, for these people lived to a great age without exhibiting any signs of ill-health.

The worst effects of arsenic as an industrial poison which I have seen have been not so much upon the internal organs as upon the skin. This was especially so upon the hands and fingers, also upon the external reproductive organs of men engaged in mixing colours, of which Scheele's green formed a large constituent. The skin of the fingers and hands was ulcerated, often down to the bone; the ulcers were angry-looking and painful.

The presence of arsenic in soot is regarded as the cause of chimney-sweep's cancer, also of malignant growths upon the hands of gardeners who use soot for potting and other purposes.

Arseniuretted hydrogen, when inhaled, rapidly induces sickness and vomiting, followed several hours afterwards by jaundice and hæmoglobinuria or hæmaturia. The breaking-down of the red blood corpuscles is so complete that the hæmoglobin becomes incapable of carrying on its respiratory function, while the liver and kidneys are severely taxed in regard to the elimination of the disintegrated products.

Mercury.

In the industries subacute and chronic forms of mercurial poisoning may be met with. Of the organs primarily affected in the less acute forms of poisoning the salivary glands call for mention. They are stimulated to great activity, the gums are swollen, the teeth loose, the breath fetid, and on the buccal mucous membrane small ulcers may be observed. The submaxillary glands become enlarged, mastication is difficult and painful, there are diarrhœa and loss of appetite, followed by pains in joints and limbs. To the psychical troubles, of which a sense of timidity and loss of self-control before strangers are noticeable features, the term *Erithismus mercurialis* has been applied. Voluntary muscular movement becomes inhibited. In addition to the inordinate flow of saliva, there are muscular tremors, at first mainly of the muscles of the face and hands, but if the individual continues to follow his occupation the tremors become general and render the individual helpless. In the company of Dr. Giglioli, of Turin, I had the opportunity a few years ago of visiting the mercury mines on Mont Amiata, and of witnessing some unusual signs and symptoms. Several of the men were so much affected through inhaling the fumes of the metal that, if during the act of walking, and this generally with a staggering gait they were called upon suddenly to stop, they could not immediately arrest their progress. In attempting to do so they were either precipitated forwards or swayed excitedly forward and backwards. There might be no tremor observable when the body was at rest, but tremors became immediately apparent, equal in range to those observed in disseminated sclerosis, when slight effort was made. So violent may the movements subsequently become, or so extreme the muscular paresis or paralysis, that many of the affected smelters are ultimately rendered completely helpless; they can neither feed nor dress themselves. Workers in mercurial compounds not infrequently have albuminuria. With their swollen gums, fetid breath, and muscular tremors, the men present a broken-down appearance and have an unhealthy, sallow look.

Phosphorus.

As far back as 1870 the sufferings of lucifer match-makers had attracted public attention. In 1872 Finland, in 1874 Denmark, in 1897 France, in 1898 Switzerland, and in 1901 the Netherlands had prohibited the use of white phosphorus, but the regulations had not the desired effect, nor was any united and organised effort made to secure this object until Switzerland, in 1906, invited the various countries to attend a meeting in Berne, known as the Berne Convention, and at which the countries represented unanimously agreed to the prohibition of the dangerous metalloid. French chemists had found in sesquisulphide of phosphorus a safe substitute for the dangerous form, and wherever it has been used phosphorus necrosis has disappeared as an industrial disease. To France, therefore, belongs the credit of having made possible the replacement of a harmful by a harmless chemical agent in this important industry. It was not, however, until 1919 that India and Japan joined the Convention, but even as late as 1923 China had not done so. In 1925, according to the *China Journal of Science and Arts* of February and March of that year, there were 15,000 persons employed in lucifer match factories using white phosphorus. In January, 1925, China definitely prohibited the use of the harmful material, so that with her entrance into the Berne Convention there is now the probability of the disappearance of a painful occupational malady in the Far East.

Radio-active Substances and the Health of the Workers.

Three years ago my attention was drawn by Dr. F. L. Hoffman to the occurrence of necrosis of the jaw-bone and of aplastic anæmia in young women engaged in painting numerals on illuminated watch and clock dials. There had occurred six deaths and there had been reported seven cases of serious disease.[3] Radium salts formed the basis of the luminous material; one of the manufacturing firms used mesothorium. In painting the numerals on the dials the girls were in the habit of pointing with their lips the camel's hair brushes, and although each of the workers was given a bottle of distilled water in which to wash the brush before putting it between the lips, they disregarded the provision. The girls had followed the occupation for three years or more. Exposure to large amounts of radio-active material is followed by changes in the blood of the workers, microscopical examination revealing a reduction

[3] Monthly Labour Review, U.S. Department of Labour, May, 1926. Pp. 20.

in the number of polymorphonuclear and lymphatic corpuscles. The leucopenia is pronounced. There is also a degree of anæmia suggesting a diminished output of red blood corpuscles from the bone-marrow. The colour-index, however, remains high. Many of the women in this occupation complained of headache, malaise, tiredness, and a sense of the need of more sleep, nervous irritability, and disordered menstruation, but the morbid condition which specially attracted attention was necrosis of the jaw-bone. For information of these cases we are indebted to a report furnished by Dr. Cecil K. Drinker, Dr. Martland, and others. The necrosis closely resembles the diseased bone found in phosphorus poisoning. An interesting point in regard to exposure to radio-active compounds is that the disease which develops may lie latent for a few years before showing its destructive effects upon the teeth and jaw-bone. From the outset these agents affect the blood and blood-making organs; in small doses they temporarily increase the numbers of red and white corpuscles of the blood, and this increase is followed, if the exposure continues, by a destruction of the white and by a diminished production of the red corpuscles, hence the consequent anæmia. In September, 1927, I examined in New Jersey five of these women dial painters; three of them could hardly walk or sit on a chair, except in a slanting position with limbs fully extended. Osteitis and strong adhesive fibrositis of the hip-joints prevented abduction of the limbs. In some of the women small areas of exposed portions of the lower jaw-bone could be seen and felt in the mouth.

ROYAL PHOTOGRAPHIC SOCIETY OF GREAT BRITAIN.

THE Seventy-third Annual Exhibition of the work of this Society's members now being held at 35, Russell-square, London, W.C., shows vividly the degree of perfection which photography, both utilitarian and artistic, has attained. Colour photography has made great strides and many fine stereoscopic colour transparencies were on view; on the scientific side it is of great value in many fields. Several spectra of salts, glass and other substances photographed by polarised light illustrated the diacritical value of this method, which also serves to check the quality of artificial sunlight. One interesting use of monochrome photography is to test the efficiency and freedom from glare of motor-car headlights, and the general Motors Corporation exhibited an excellent series of photographs to show how this was done. Eastmans displayed their Panchromatic film and Wratten light filters, which immensely facilitate the reproduction of many coloured objects, such as paintings. Of especial medical interest was a fine series of X ray photographs by Kodak Ltd. and Ilford Ltd.; among others taken by Dr. J. H. Mather, one illustrated a gall-bladder after the oral administration of sodium tetraiodo-phenolphthalein. The life-history and minute structure of the green-house fly was depicted in five frames of microphotographs by Dr. G. H. Rodman. In addition to pictures many cameras and pieces of apparatus were on view. The exhibition remains open until Oct. 13th.

NEGLECT OF VACCINATION IN IRELAND.

FROM recent reports in the local press it would seem that, notwithstanding pressure from the authorities, there is still a good deal of opposition to vaccination in some areas in Ireland. At a recent meeting of the Fermoy (co. Cork) Urban District Council a letter was read from the Department of Local Government and Public Health stating that unless the Council took the necessary steps to make sure of compliance with the Vaccination Acts, the Minister would have no option but to institute proceedings to compel the Council to perform its legal duties. When the list of defaulting parents was read out, it was noticed that it contained the names of the chairman of the Council and of at least one other member. At Enniscorthy, co. Wexford, the urban council was directed by the Minister to institute legal proceedings against those who did not comply within a reasonable time after notices to carry out vaccination had been served on them. No action was taken, the chairman declaring that the serving of notices was as far as the Council could go.

PTERYGIUM IN MADEIRA.

THE origin of the peculiar encroachment of the conjunctiva on the cornea known as pterygium is still something of a mystery, some doubt having been thrown on Fuchs's plausible explanation that it is a further stage of pinguicula, but the circumstances under which it arises are fairly well known. Rare in England, it is common in dry climates with sandy soils, and among farmers, threshers, ranchmen, and others exposed to the elements. In the United States it is much more frequent in the south-western than in other areas; heat, dryness, wind, and exposure to sunlight and alkaline dust are there regarded as predisposing causes. Coming nearer home, the island of Madeira has been mentioned as a place where the condition is endemic; this is twice affirmed in the French encyclopædia of ophthalmology published under the auspices of Lagrange and Valude. Dr. Alfredo Rodrigues read a paper before the Third National Congress of Medicine, held at Lisbon recently, to controvert this statement. Pterygium, he admits, does occur in Madeira, where the hygienic conditions are neither better nor worse than in other marine resorts, but in his experience it amounts to less than 15 per cent. of all ocular affections met with on the island. This is much less than the frequency quoted by an English doctor, Heineken, a hundred years ago. The influence of high insolation may be present in Madeira, but the factors of high wind and dust are not. The town of Funchal itself is situated in a sheltered amphitheatre of mountains, and even the sun's rays are tempered by the nebulous atmosphere of the gulf stream.

SWORD-SWALLOWING.

AN advertisement in the personal columns of the *Times* of Sept. 12th for a sword-swallower "required to assist doctor in experiments" is a reminder that sword-swallowing has its dangers, although there may be few cases on record in which it has led to the death of the performer. Gross perforations of the œsophagus are, of course, uncommon, but considerable damage may be done by minor injuries. In 1885 Dr. Charles Gross reported the case of a man, aged 30, who conjured in public-houses as a recreation. Two days before admission the sword hurt him more than usually, and on withdrawing it he spat a little blood. His neck began to swell and swallowing became more difficult and painful, until he died suddenly three days after admission to hospital. Post mortem, there was no sign of any perforating wound, though a little excoriation was to be seen at the upper and posterior part, but the outermost coat of the œsophagus and the surrounding tissues were a diffused abscess extending from the back of the pharynx to the diaphragm. The news of this man's death induced two other sword-swallowers to consult Dr. Gross about the dangers of their curious profession. They were both in the habit of swallowing swords 21¼ inches long, the blade tapering from 1¼ to 1 inch, straight, heavy, thick, smooth, with well rounded edges and point. They gave a demonstration which he described thus: "Straightening the passage by well elevating the chin, then putting the point of the sword well to the back of the throat, with one thrust they pushed it down as far as the hilt." Both of these experts acknowledged that they frequently hurt themselves, and one of them had been in St. Thomas's Hospital with an injury to the œsophagus, apparently a lesion of the mucous coat of the lower part.

PLASMOQUINE IN MALARIA: A CORRECTION.

IN Dr. Manson-Bahr's paper on the Therapeutic Action of Plasmoquine, published in our issue of Sept. 8th (p. 496), the statement is made, under the heading "For Benign Tertian and Quartan Malaria" that "treatment should extend over a further 44 days, composed of four separate weeks' treatment (making five weeks in all) of *12* tablets of plasmoquine compound daily with four days' interval between each week." In this sentence the figure 12, which we have italicised, should read 6.

UNEQUAL PUPILS.

M.R.C.S. writes: For years I have been in the habit of shaving in my bath, but have only recently taken to using a mirror. Since doing so I have noticed that my pupils, equal before I begin, become unequal during the act of shaving—the left much larger than the right. Within half an hour they return to equality. I am told I am physically sound and have no aneurysm. I have no explanation to offer, other than a very localised fear reflex due to performing a risky operation whilst on an insecure foundation. I should be interested to hear what other explanations occur to your readers.

MEDAL FOR A MEDICAL MAN.—Dr. J. H. Sheldon, of Wolverhampton, has been awarded a bronze medal by the French Government for courageous rescue work on the Aiguille du Petit Dru in the Alps.

A WOODEN HOSPITAL BURNED.—About one-half of Driffield Isolation Hospital, which consisted chiefly of wooden hutments of the army pattern, has been burned down. The fire was caused by a rubber mat hanging on a bathroom wall falling upon a lighted gas ring, and spread so rapidly that in five minutes all the wards were in flames. Of the 60 beds only 18 were occupied by patients, suffering from scarlet fever, typhoid, and diphtheria, and they were all safely removed to a new brick block which had just been completed. It will be remembered that it was only at the end of April last that two wards at the King Edward VII. Hospital at Windsor were burned.